THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVIII. No. 708.] LONDON, DECEMBER 5, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL

COAL. Analysis—12,000 cubic feet of gas per ton of coal: 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

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RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE. London, at the Lombard Exchange, 39, LOMBARD ST., E.C.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).

These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

STEVENS & CO.,
(SUCCESSORS TO SAMUEL CALLEY. ESTABLISHED 20 YEARS.)
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WORKS: BRIXHAM, TORBAY.

THOMAS PROUD,
MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS & PURIFIERS.

Scrubbers fitted with Mr. Livesey's Boards are found to be highly effective in diminishing cost of purifying.

BROOKFIELD IRON-WORKS,
103, ICKNIELD STREET EAST,
BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

JOS. COWEN & CO. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
LIMITED,
THE WEDNESBURY TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.

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COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE,
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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.

J.R.&Co.,Ld., are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. & Co., Ld., make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

Lists may be obtained on application to
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MANUFACTURERS OF
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OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
ALSO, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.

ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
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MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.

SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
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RETORT-SETTING A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS guaranteed to carbonize a large amount of coal with a small per cent. of fuel.

N.B.—All kinds of Fire Goods, &c., kept in stock for immediate delivery. Orders promptly attended to.

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PATENTEES OF THE

NATIONAL STANDARD GASOMETERS

FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
AND MANUFACTURERS OF

IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

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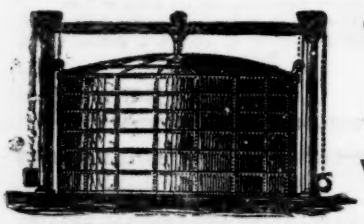
MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS



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WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS
GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,
AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

LONDON OFFICES: 92, CANNON STREET.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

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GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

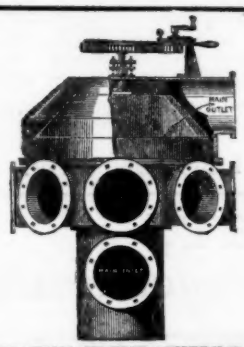
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

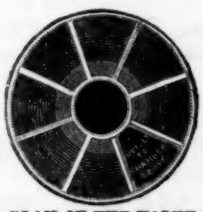
JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

C. & W. WALKERS'

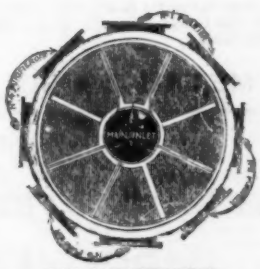
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

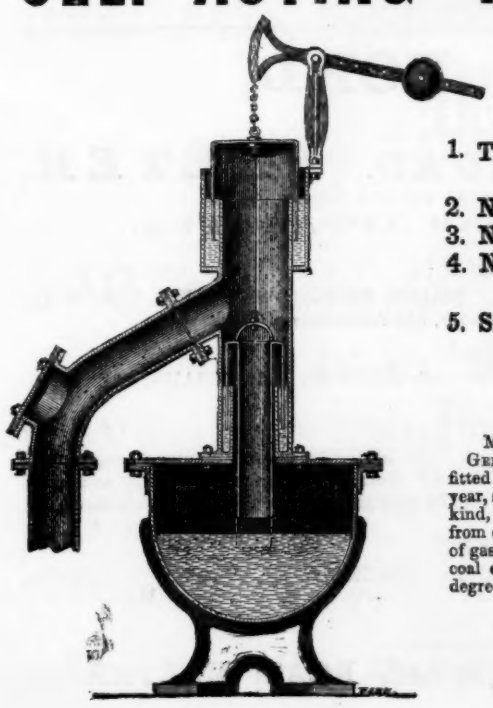
These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Tenby Gas-Works, March 29, 1876.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—In reply to your inquiry, I have to say that all the retorts at these works are fitted with your Self-Acting Patent Dip-Pipes. They have been in use now for more than a year, some for more than two years. They have never required repair or attention of any kind, and work admirably. By the use of these removable dips the retorts are kept quite free from carbon, the charges burn off more quickly than before they were adopted, and the yield of gas is increased. We get regularly a weekly and monthly average yield of gas per ton of coal exceeding 10,400 feet of 14-candle gas, and I attribute this excellent result in no small degree to the use of these Self-Acting Removable Dip-Pipes.

I am, gentlemen, yours faithfully,

(Signed) EDMUND H. STEVENSON.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

4, WESTMINSTER CHAMBERS, VICTORIA STREET, S.W.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

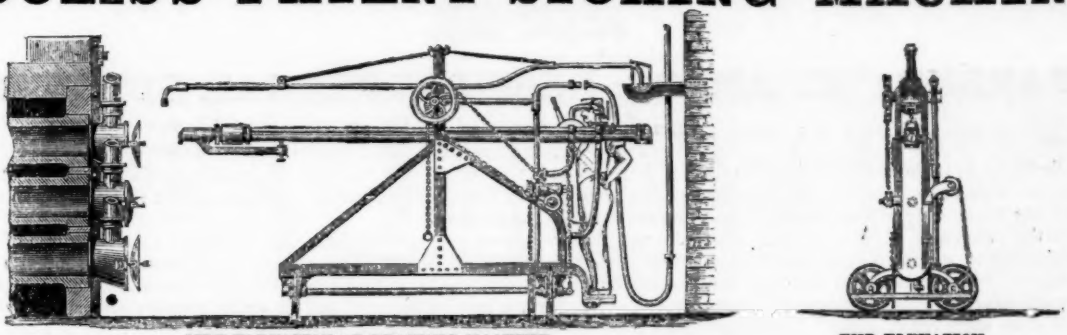
IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE. END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

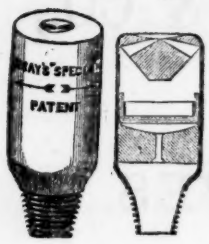
SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

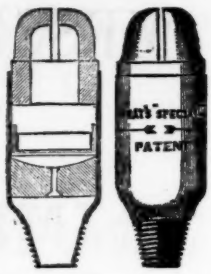
A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.



BRAY'S NEW GAS-BURNERS.



BRAY'S "SPECIAL" PATENT. TRADE MARK.

A NEW FEATURE IN GAS LIGHTING.

OUR WELL-KNOWN

PATENT "ENAMEL" REGULATOR GAS-BURNERS

(UNION JETS AND BAT'S-WINGS)

Were designed as improvements on the common Burners, and that object has been so successfully attained that they have, we believe, met with more approval and recommendation from the Gas Engineering Profession and the Public than have been accorded to any other firm's make of Burners since the commencement of gas lighting.

Of the two kinds of Burners—the Union Jet and Bat's-wing—in general use, the latter is the least useful, because of its want of adaptability to general circumstances, and great liability to get out of order; but, when in good order, it has hitherto had the advantage of yielding more light with common and medium qualities of gas than the Union Jet. The Union Jet, on the other hand, has the advantage of greater adaptability, being useful everywhere, is less liable to get out of order, requires scarcely any attention, and will stand more rough usage. Notwithstanding these great practical advantages, which are almost everything in a Gas-Burner, Gas-Burner improvers have been attracted to the Bat's-wing, because of its giving a more showy result when tested for illuminating power only.

We have succeeded in improving both Bat's-wing and Union Jet Burners; but, while adding materially to the efficiency of the first-named, it is specially noteworthy that the Union Jet has received most advancement by these improvements. While retaining all the advantages of the Union Jet, we have brought it up in ILLUMINATING POWER to the level of the most expensive Bat's-wings specially got up for developing that feature. The result is such that we have no hesitation in pronouncing BRAY'S "SPECIAL" UNION JET

THE BEST BURNER HITHERTO PRODUCED,

AND

A NEW FEATURE IN GAS LIGHTING.

The leading features of this NEW UNION JET may be summarized as follows:—

It gives more light, from the smallest to the largest sizes, than any Union Jet was ever before known to give.

It gives 30 to 60 per cent. more light than the common Union Jets, and 15 to 20 per cent. more than our own much commended Patent "Enamel" Union Jet.

It gives as much light as the most expensive Bat's-wings specially constructed for high illuminating power, without the Bat's-wing's disadvantages.

Tested on the Photometer at various consumptions—say, 3, 4, and 5 feet of Gas per Hour, or any similar variation—and the results averaged, our New Burner will show a higher illuminating power than the best Argand. If the tests are made downwards and upwards as well as laterally, the results will be still more in favour of our New Burner.

ADDITIONAL ADVANTAGES possessed by our NEW BURNER over all others in the market, and these are applicable and are added to our IMPROVED BAT'S-WING:—

In all Burners having an arrangement for diminishing the flow of Gas before it arrives at the point of ignition, that part of the Burner which effects this object has been a source of weakness, because of its being placed in a position very liable to fracture, and easily tampered with. Indeed, this is so arranged that any one can get at and break or widen out the inlet for the Gas at pleasure, and make what ought to be an economical Burner a most extravagant one. In our New Burner, this part is so hard that it cannot be enlarged by drilling, and is so arranged that it cannot be otherwise tampered with without breaking up the whole Burner; this forming, we believe, the most efficient safeguard yet introduced against the extravagant use of Gas by those who have not to pay for it.

The Gas Supply being given through one ROUND hole, which is made through non-corrosive material, it is not so liable to stop up or get out of order as in cases where a number of small holes or narrow slits are used. When these holes are made through *metal*, the lasting property of the Burner so constructed is almost *nil*, even if the aperture is not tampered with.

There is no hissing noise caused by the passage of Gas through the diminishing arrangement of this Burner.

☞ All our "Special" Burners have our Trade Mark stamped on the sockets thus BRAY'S "SPECIAL" PATENT.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

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TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street.
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

IMPROVED HAND-POWER LIFTING MACHINES.

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The following are a few of the leading Sizes in use in Gas-Works and Chemical Works:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4*	2	9	815	18
3	3	9	1,830	18
5	2½	12	1,250	21
5*	3	12	1,830	22 10
4	4	12	3,250	25
6*	4	12	3,250	30
5	5	12	5,070	32 10
7*	5	12	5,070	40
6	6	12	7,330	40
8*	6	12	7,330	50
7	7	12	9,750	50
10*	7	12	9,750	65

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.

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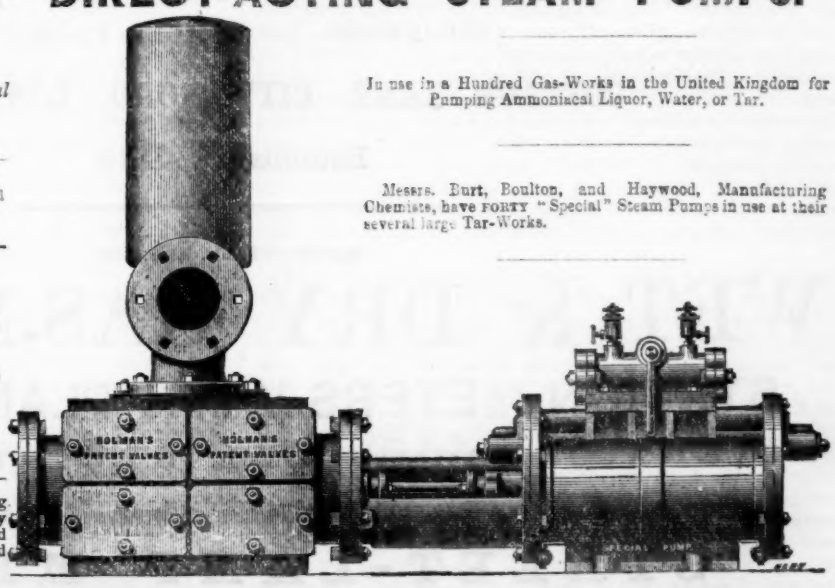

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

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2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
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Are upheld for five years without charge.

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AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

ERRATA.—*In Mr. Warner's letter, inserted in last week's* JOURNAL, *for "doubtless Mr. Wilkinson has chosen an* objectionable *word," read "*unobjectionable." *In Mr. Copp's letter, a full stop should have been inserted after the word "diminish," in the last paragraph but one, and a fresh sentence begin with the words "As soon as," &c.*

RECEIVED.—*W. Burn, Little Ilford; M. J. Parsons, Carnarvon; J. Chew, Blackpool; N. S.; T. Newbigging, Manchester; F. J. W. Hayes, Birmingham; R. Good, Carshalton.*

A DISINTERESTED OBSERVER.—*Your letter, if not libellous, would be very offensive, and necessarily call for a long reply. Besides, the matter is after all too personal to engage so much space in our columns.*

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, DECEMBER 5, 1876.

Circular to Gas Companies.

WE publish to-day that portion of the Tenth Annual Report of the Warden of the Standards, to which we referred last week. It will be found to possess considerable interest. We do not feel certain that the chronological history of the invention of the different photometers is perfectly correct; indeed, we think that on two points it is wrong—viz., the dates of the invention of the Evans and Letheby instruments. A misprint of a date probably occurs in connexion with the account of the former; and as regards the latter, the date of its first use in testing gas in the City of London, under the Metropolis Gas Act, 1860, is represented as the date of its invention. Dr. Letheby, we have reason to believe, had used the instrument for several years before 1863. These are, however, quite unimportant matters. The fact remains that, at the present moment, most of the apparatus employed in testing the illuminating power of gas is unverified. The meters, of course, bear the stamp of the public testing officers. The cubic foot bottles employed in the metropolitan testing offices have, we understand, been verified by the Warden of the Standards himself; but the photometers, with their dimensions and graduations, we take on the faith of the makers. We do not believe that the confidence is abused. Whatever deviations from strict accuracy (if any) might be found, would only be such as might be seen in any ordinary graduated yard measure, when compared with the standard in possession of the Warden. For all practical purposes, they may be received as accurate; but it is well to know, that, so far as the Letheby instrument is concerned, there is now in existence a standard bar, by means of which the accuracy of the graduations may be verified.

It is not likely that any further legislation on this matter will take place, at all events for some time to come. The Evans and the Letheby photometers are both, it may be said, legalized by the Gas-Works Clauses Amendment Act, 1871; and a choice is left to the undertakers, which of the two they will employ. If the Warden will have a standard bar graduated for the Evans photometer, we shall have all the means of verification we require.

But accuracy of graduation will never ensure accuracy of observation, nor will it prevent the sources of error unavoidable when candles are employed as the standard of comparison. These latter, however, we believe to be much smaller than they are commonly represented. When an Examiner carefully follows the Instructions of the Metropolitan Gas Referees, we consider the candle test to be a perfectly satisfactory one. We have, however, seen an Examiner with a Letheby photometer commence his observations almost immediately after the candles were lighted; while another, with the Evans instrument, took his readings after whisking the candles backwards and forwards, and while the flames were still flickering with the draught created.

A hope, however, dawns, that candles and bar photometers may, after all, be counted things of the past. Satisfactory as we consider the candle test in the hands of competent and careful observers, we should regard with pleasure the general adoption of the "Illuminating Power Meter" as a standard. It is, we believe, the one test that can be most relied on to give constantly accurate results. There would be no difficulty in defining this instrument, and its use, in an Act of Parliament, and we look forward to the time when it may be enacted that the quality of the gas supplied shall be such that a consumption of so many feet per hour, from a certain orifice and at a given pressure, shall maintain a constant flame, say three inches in height.

This would be a great simplification. For instruments, we are reduced to an accurate clock and an accurate meter. True, different observers may differ somewhat as to the height of the flame; but this "personal error" must always be small.

The next report of the Warden will be of interest, for in that he proposes to give an account of the results of the reverification of the three metropolitan copies of the gas-measuring standards which is now in progress. The standards themselves are subject to reverification every seven years, and the operation for 1876 has been completed. The result shows that the variations of capacity occasioned by the oxidation of the metal composing the gas-holders, and other causes, in the course of the seven years, is extremely minute. The pressure on our space prevents us from printing the Appendix to this Report, giving the results of the reverification of the standards; and we may well leave the matter over until next year, when we shall give what will be of more interest, an account of the variations in the capacity of the metropolitan copies.

We hear nothing more of proceedings to be taken, either against the Chartered Company or the Referees, for the alleged nuisances which are said to be occasioned by the efforts of both parties to keep down the "sulphur" impurity in gas. The notice of the Bill we referred to last week, shows the desire of the Directors of the Chartered Company to fall in with popular wishes; and, perhaps, it is on this account that the local authorities, who have complained, abstain from taking action. In any case, the result is satisfactory, so far as it leaves the way open for a settlement of the question by peaceful means, without law charges on either side. The Bill of the Chartered Company, if unopposed, will do all that the complaining vestries at present desire. It will relieve them of all risk of stink at the works, if it should result in the addition to, or rather non-removal of a small quantity of sulphur from, the gas.

When the Birmingham Corporation Gas Bill was before Parliament in 1875, and was being opposed by all the small local authorities whose districts had been supplied by the Birmingham and Staffordshire Gas Company, and who, envious of profits which might be made for the advantage of Birmingham, desired, each one, to possess a gas undertaking of their own, we expressed an opinion that those authorities would do well to take gas in bulk from the Corporation of Birmingham, or make other arrangements by which the Staffordshire undertaking would be left in its integrity. We, as the consistent advocates of amalgamation in the Metropolis, and therefore earnest believers in the economy of large works, could hardly witness, with satisfaction, the splitting up of one considerable undertaking into four or five small concerns. This, however, is what it appears will happen. Perhaps the late Mayor of Birmingham is, in great part, responsible for the result. He was always talking of the large profits that would accrue from the possession of the gas undertaking, and the grand things that might be done in his own borough with those profits. This, naturally, excited the envy of the surrounding local authorities, whose limits would be supplied with gas by the Corporation of Birmingham, and

who each one desired a share of the plunder for the advantage of their own district. Thus it happened that they all took advantage of a clause, the insertion of which they procured in the Birmingham Gas Act, 1875, and last session obtained Acts for themselves. The leading provisions of these Acts will be found, as fully described as our space will allow, in another column. We may here, however, refer shortly to the broad results of the legislation. Each of the local authorities obtain power to purchase, by agreement or arbitration, the gas-mains within their district, now belonging to the Corporation of Birmingham. They are also empowered to take land and erect gas-works of their own, in order to utilize those mains and pipes. When they have done this, they will be compelled to supply gas of the same quality as that furnished by the Corporation of Birmingham, and at the same maximum price. Now, it seems clear that these authorities (we, of course, except the Corporation of Walsall) do not feel at all certain of making a profit, for each one has obtained the insertion of a clause which makes it legal for them to make up any deficiency in gas revenue from a general district-rate, and in no case, we think, makes it absolutely obligatory, that the district-fund shall be recouped. As regards West Bromwich, the contemplated possibility of realizing a loss from the gas undertaking, made it necessary for the Commissioners to obtain power to levy an unlimited improvement-rate. They had before been restricted to 1s. 2d. in the pound.

We cannot regard the prospects of these authorities as at all hopeful. We are supposing, of course, that they have all given the necessary notice of their intention to purchase, which must have been delivered to the Corporation of Birmingham within two months of the passing of each Act. The period allowed for the completion of the purchase is in each case two years, by the expiration of which time, we presume, all the new undertakings will be in full operation. We would fain hope that our vaticination may prove false, but we cannot help expressing an opinion that four of these authorities will rue the day they dissociated themselves from the Corporation of Birmingham. They are incurring large debts, and heavy responsibilities, for results which are entirely problematical. Only one other reflection occurs to us at this moment, and that is a regret that these Boards did not adopt the Scottish plan, and instead of throwing any loss on the general district-rate, provide for an annual estimate, which would have enabled them to make up a loss in one year by an increase of price in the next. As it is, they are tied down to a maximum of 4s., and if this does not pay, the loss, as we have said, must be made good from the general rate, and thus the gas consumer may profit at the expense of a non-consuming ratepayer. We shall say nothing more to-day, although the subject is rather tempting to enlarge upon.

At this moment we have not learnt the result of a meeting of ratepayers and owners held at Warrington, on Friday, and convened by the Town Council under the provisions of the Borough Funds Act. A large meeting on the previous evening unanimously condemned the proceedings of the Council relative to the purchase of the Gas Company; and if at the statutory ratepayers meeting, held next day, a resolution approving the promotion of the Bill was carried, we may be certain that a poll was demanded, the result of which cannot be doubtful.

[At the statutory meeting the resolution approving of the proposed purchase was negatived, and a poll was demanded on behalf of the Corporation.]

The Town Council will, we think, have to abandon their design for a time, and the Gas Company will retain the possession of their property. These latter may be congratulated on the result.

It is noteworthy that the principle of the purchase is not at all objected to, but rather approved. It is the price alone which rouses the opposition. Now, whether or not twenty-five years purchase of profits is too much to pay for a statutory undertaking, we shall not argue. It is the price which Parliament has invariably allowed. Dr. Farr may think seventeen years purchase a sufficient consideration, and it may be admitted that ordinary commercial concerns, such as banks, do not realize anything like the value set upon a statutory gas undertaking. A writer in the *Warrington Guardian* seems to think that if a sound and profitable banking concern only fetches six years purchase, it is the height of absurdity to pay a gas company twenty-five years purchase. The difference in the two cases is apparent to all but those who are wilfully blind. We gather from the local press that the price the Corporation have agreed to pay is £154,000.

The figures we gave last week, it should have been stated, were the results of Mr. Spice's valuation. That gentleman estimated the profits of the current year at £7000, and capitalizing this sum at the usual rate, he found the fair value of the undertaking to be £175,000. The writer in the *Guardian*, alluded to above, falls into one mistake, which it may be as well to correct. Supposing the Corporation bought on his estimate Mr. Spice calculates that they would realize, by the first year's working, a profit of £1380. But this sum, says the writer alluded to, would be all swallowed up by the payment to a sinking-fund. Now, it is the almost universal practice of Parliament to allow five years to elapse from the time money is borrowed by a local authority for gas purposes, before it is compulsory on them to commence a sinking-fund. Thus the Corporation of Warrington might have five years profits to accumulate, before the first payment to a sinking-fund became due.

The Local Board of Sherborne are anxious to acquire the undertaking of the Sherborne Gas and Coke Company, which is a flourishing little concern, paying eight per cent. The consideration offered by the Board is annuities, of 8s. per share (£5), with the option of redeeming such annuities whenever they think fit, by the payment of £7 for each £5 share. We gather, from the report of a meeting of the Board in a local paper, that the Directors of the Company might be disposed to sell, if the Board offered £8 per share. Further discussion of the matter is deferred until the next monthly meeting of the Board.

Water and Sanitary Notes.

It would be a happy thing if those who presume to dictate to us what water is fit, and what is not fit, for human consumption, would, once and for all, arrive at some common agreement on the matter. Why do not one, or both of those busy bodies—the Society of Arts or the Social Science Association—get up a conference of doctors and analysts on the subject? We know very well that no agreement would be come to; but, by the very diversity of opinion which would be expressed, and the contradictory facts which would be quoted, public anxiety on the subject would be allayed, and the conclusion might be drawn, that, after all, it little mattered, from a sanitary point of view, what water was drunk. Our attention has been drawn to the question by a dispute as to the wholesomeness or not of the water supplied to Maldon in Essex. Samples of this water were sent to two analysts, both medical men, whose names need not be given. One of them reported the water as utterly unfit for use, the other decides that it is fairly good and quite wholesome. We have no details of the analysis made by the first; but the second reports 81 grains of solid matter in the gallon—23 grains of which were carbonate of soda, and 41 grains common salt. There was but a small amount of organic matter present. Now, for our own parts, we cannot regard such a water as unwholesome. Impregnated with carbonic acid, it would make excellent Seltzer water, which would be imbibed with much satisfaction. The townspeople of Maldon may rest satisfied that they are not being poisoned by the Company's water.

Attention has often been drawn to the enormous and wasteful consumption of water in Glasgow. It has been about sixty gallons per head per day; but some months ago, the Water Committee of the Town Council determined to make some experiments with Mr. Deacon's waste water district meters, to ascertain where the waste occurred, and remedy it if possible. The area districted contained a population of 15,692 persons, and the inspection resulted in the saving of 400,000 gallons of water per day, or about twenty-five gallons per head. The daily cost of this water to the Corporation amounts to £4; and as the whole expense of the inspection, meters, &c., amounts to only £1 per day, the saving to the Corporation is £3 per day over a population of 15,692 persons. The population within the water limits of the Corporation is about 720,000, which will give some idea of the saving that may be effected when the system is applied universally in Glasgow.

GAS LEGISLATION IN 1876.

(*Continued from page 767.*)

The following Acts provide for the transfer of gas-works to Local Authorities, either from companies or from other authorities:—

The *Horncastle Gas Act*, which authorizes the sale of the undertaking of the Horncastle Gas Company to the Local Board, was noticed in our "Circular" last week, and need not be here referred to.

The *Llandudno Improvement Act* provides for the transfer of the undertakings of the Llandudno Gas and Water Company to the local sanitary authority. The consideration is perpetual annuities equal to seven per cent. on the capital actually expended, the Commissioners taking stores and stock-in-trade at cost price, and assuming the mortgage debt of the company. The Commissioners are to supply fourteen-candle gas at a price not to exceed 6s. 6d. per 1000 feet. For the purposes of this Act, which provides for the supply of a public band as well as gas and water, the Commissioners take power to borrow £50,000, and such further sums as the Local Government Board will sanction.

We may next notice in alphabetical order the Acts which authorize the purchase by several local bodies from the Corporation of Birmingham of various portions of the undertaking formerly belonging to the Birmingham and Staffordshire Gas Company. In the Birmingham Corporation Gas Act, 1875, it, was provided, that if any local sanitary authority, or authorities within the limits of supply of the Staffordshire Company, should bring in a Bill in the next or next succeeding session of Parliament for the purchase of so much of the undertaking contained within their district, always excepting the West Bromwich Works, the Corporation of Birmingham would not oppose the application. Further, it was enacted, that, if within two months after the passing of an Act, notice of purchase be given by such local or sanitary authority, the Corporation, &c., shall sell by arbitration. But, in view of the several authorities who were at the time opposing the Corporation of Birmingham, it was provided that one arbitration should determine for all the principle of valuation.

In last session four local sanitary authorities and one Corporation (Walsall) obtained Acts empowering them to purchase the mains and plant lying within their respective limits. As the whole of the district was supplied with gas from the West Bromwich works, which the Corporation of Birmingham retain, all the purchasing bodies (with the exception of the Corporation of Walsall) will have to erect new manufacturing and storeage works. Supposing, therefore, all the formal arrangements for purchase completed, the supply of the districts will be for another year and more in the hands of the Corporation of Birmingham.

The *Oldbury Local Board of Health Act* empowers the Board to purchase the mains, plant, &c., within their district. For this purpose they have obtained power to borrow as much money as may be required for the purchase, and a further sum of £40,000, the estimated cost of the permanent works authorized, and then afterwards, with the sanction of the Local Government Board, of such further sums as they may think requisite, not in the whole exceeding £50,000. The usual enactments are made to ensure (if possible) the re-payment of the money borrowed within a period of sixty years. But the borrowing powers of the Board are not yet exhausted. In the session of 1875 they incurred a debt in opposing the Corporation of Birmingham and the Gas Company, and they have obtained power to borrow £1500 to pay this off. This loan must, however, be repaid within the next ten years. This Act, following the Birmingham Gas Act, requires the Board to supply fifteen-candle gas at a maximum price of 4s. per 1000.

The *Smethwick Local Board Gas Act* authorizes that Board to purchase so much of the gas undertaking of the Corporation of Birmingham as lies within their district. For this purpose the Board obtain power to borrow the money necessary for the purchase, and also a further sum not exceeding £50,000. The money borrowed is to be paid off within a period of sixty years. It should be remarked here, that the Smethwick as well as the Oldbury Board propose to avail themselves of the Local Loans Act, 1875, and, if they think fit, raise the money they require by the issue of debentures, debenture stock, or annuity certificates. The Smethwick Board obtain power to make up any deficiency of gas revenue from the general district-rate; but it is provided that nothing shall be taken from that rate so long as gas is sold to any consumer under the maximum price. In this case also power is granted to borrow money (£2000) to pay the parliamentary expenses incurred in 1875.

The *Tipton Local Board Act* authorizes the Board to purchase so much of the gas undertaking of the Corporation of Birmingham, as is situate in the parish of Tipton, and to acquire lands for the erection of works for the manufacture and storeage of gas. To carry out the Act the Board obtain power to borrow first of all so much as is required to complete the bargain with the Corporation of Birmingham; next, a sum not exceeding £25,000 for the erection of permanent works; and, finally, and with the consent of the Local Government Board, such further sums not exceeding £25,000, as may be requisite to carry out the purposes of the Act. Beyond this, however, there is the power to borrow £1700 to pay the costs of opposition in 1875. The Board obtain power to raise these moneys at their option, either by mortgages or the creation of annuities. This Act also provides that any deficiency of gas revenue may be made up from the general district-rate; and it directs the Board, when preparing the estimates for the rate, to include therein such sums as, in the judgment of the Board, might be necessary to provide for the deficiency in the gas account; provided always that if, and when, opportunity arises the amount of any advances so made to the gas account shall be ultimately, with as little delay as possible, recouped out of the gas revenues to the general district-fund.

The *West Bromwich Improvement Act* is to empower the Improvement Commissioners of the district to acquire so much of the gas undertaking of the Corporation of Birmingham as lies within their district, excepting, as stated above, the gas-works formerly belonging to the Staffordshire Company, and now in possession of the Corporation of Birmingham; and also the mains tending therefrom to the borough of Birmingham. The Act gives the Commissioners power to borrow such sums as may be required for the purchase of the mains, &c., and a further sum of £50,000 for permanent works, and, with the sanction of the Local Government Board, an additional sum of £25,000 for the carrying out the purpose of this Act. The costs incurred by the Commissioners in opposition, in 1875, amounted to about £1800, and this sum also they have power to borrow. The larger loans must be repaid within a period of sixty years, but this last named must be paid off within ten years. The Commissioners have power to raise the money by the creation of annuities and the issue of debenture bonds under the Local Loans Act, instead of by mortgage, if they think fit. The Act legalizes the making up of deficiencies of gas revenue from the general improvement-rate, with a similar proviso to that quoted above, to which another is, in this case, necessarily added. Provided also that the Commissioners may, for the purposes of this Act, levy a general improvement-rate exceeding 1s. 2d. in the pound, anything in the Act of 1854 notwithstanding.

The Acts above noticed confer on the several authorities the general powers, with regard to gas supply, granted to the Corporation of Birmingham by their Gas Act, 1875. They are required to supply gas of the same quality—viz., fifteen candles, and the price is not to exceed 4s. per 1000 feet. The test-burner is to be Sugg's "London" Argand, No. 1.

The *Walsall Gas Purchase and Borough Extension Act*, so far as regards the gas purchase, confirms a provisional agreement made with the Corporation of Birmingham for the purchase, by the Improvement Commissioners, or Corporation of Walsall, of the lands, works, meters, fittings, and effects, formerly belonging to the Staffordshire Gas Company, situate in the borough of Walsall. The consideration agreed upon was the yearly payment of £1300, in half-yearly instalments. This Act abolishes the Improvement Commissioners, and transfers their property to the Corporation. It also extends the limits of the borough, and this necessitates some provisions which are of purely local interest. The Act gives the Corporation power to charge a maximum price of 4s. per 1000 feet for gas within the former limits of the borough, with at any time an additional charge of sixpence in the extended limits. This sixpence is, however, to be carried to a separate account, and applied towards paying off a special loan, and as soon as this object is accomplished the right to inflict the additional sixpence will cease. The Corporation take power under the Act to borrow £100,000, for the purchase of lands and the erection of new gas-works.

Ramsgate and Margate Gas and Water Supply.—At a special meeting of the Ramsgate Local Board, on Thursday last, a resolution was adopted affirming that it is expedient for this board to acquire, by agreement or otherwise, the undertakings of the Company of Proprietors of the Ramsgate Water Works and of the Isle of Thanet Gas Company, or of part thereof, and to make further provisions for the supply of gas and water within the limits of supply of the said companies; and that this board do promote a bill in Parliament accordingly, and apply such portion as may be necessary of the general district-rates leviable by them to the payment of the costs and expenses attending the promotion of the same. On the previous night a meeting of ratepayers and others was held in the Town-hall, Margate, at which it was resolved that it be recommended to the Corporation to oppose the Bill of the Isle of Thanet Gas Company, and to assist the Ramsgate Local Board in obtaining an Act authorizing them to purchase the undertaking of the company, on condition that the said local board transfer such portions of the works as are in the borough of Margate to the corporation of that borough, at cost price, the burgesses, of course, paying their fair share of the cost incurred in obtaining such works.

Manchester District Association of Gas Engineers.—The 28th quarterly meeting of the members of this Association was held at the "Mitre" Hotel, Cathedral Gates, Manchester, on Saturday, Nov. 25—Mr. John Storer, of Stafford, the president, in the chair. There was a full attendance, and the proceedings passed off with great satisfaction to all present. After the confirmation of the minutes, which were read by the secretary, Mr. W. Longworth, of Dukinfield, two new members were elected—viz., Mr. James Dalgleish, of Glossop, and Mr. John Marsland, of Over Darwen. A very interesting paper was read by Mr. S. Hunter, the engineer of the Salford Corporation Gas-Works, on "Gas Apparatus—Proportional Capacity." It was intended that a discussion should take place on "Oxide and Lime Purification—Relative Efficiency and Cost," but this question was deferred until the next meeting. On the motion of Mr. Jaques, of Stockport, seconded by Mr. S. Hunter, of Salford, it was unanimously resolved that Mr. John Hutchinson, of Barnsley, be the president of the Association for the ensuing year. Mr. Hutchinson is an old and valued member of both this and the parent organization, "The British Association of Gas Managers." Of the latter, he is one of the original members, being one of the three gentlemen who issued the first circulars in 1863 from the Royal Hotel, Manchester, calling the attention of gas engineers and managers to the desirability of establishing such a society. Mr. Hutchinson has had the management of the Barnsley Gas-Works for nearly a quarter of a century.

New Rotterdam Gas-Works.—A new telescopic gasholder 84 feet in diameter, with 14 columns and girders, and all necessary appendages, has just been erected and completed upon the works at Kralingen, near Rotterdam, by Messrs. C. and W. Walker, of Donnington. The erection has been under the special superintendence of Mr. Walker W. Monk, the representative of that firm, and, considering the difficulties to be contended with, the work reflects great credit upon Mr. Monk. The holder was erected, the tank being full of water, and only the short time of eight weeks was occupied for its entire completion. The holder is a specimen of good construction and sound workmanship. The inlet-valve was opened on the 19th ult., and the holder is now working satisfactorily.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXX.

DISTRIBUTION (*continued*).

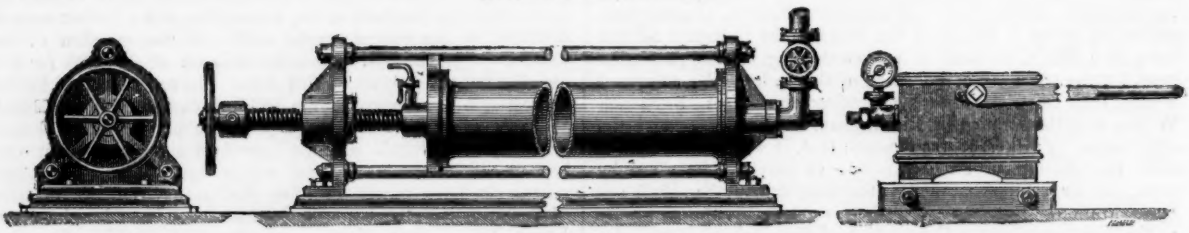


FIG. 3.

In most well-appointed gas-works, a hydraulic pipe prover or tester forms an essential part of the experimental apparatus. The above engraving (fig. 3) exhibits a useful form of this instrument, as manufactured by Messrs. Tangye Brothers and Holman, of London, which will be readily understood from the description.

It is intended for proving either flange or socket pipes, and comprises a metal bed-plate, on which are fixed two cast-iron headstocks, connected by wrought-iron bolts; a cast-iron follower, with square thread scrap-iron screw, and hand regulating wheel; screw water-valve and air-cock. The pressure-pump is of gun-metal, and is enclosed in an iron cistern, to which is attached a pressure-gauge.

The method of using the apparatus is as follows:—The pipe is placed between the headstocks, in contact with rubber rings, and the joints made by screwing up the follower by means of the hand wheel. The pipe is rapidly filled with water from any convenient source above the machine, by opening the water-valve, when the pressure may be applied by the pump. The waste water may be run into a cistern, fixed underneath the apparatus, and having an overflow into a drain.

Gas-mains should not be coated internally with melted pitch, black varnish, or any similar composition. Oxidation does not occur on their interior surface, and such expedients are of no service in reducing friction, as has been supposed. Indeed, the opposite effect is produced, for the gas in a very short space of time exerts a solvent influence upon the coating, and, detaching it from the metal, the material gradually settles in a viscid mass to the lower part of the pipe, where it acts as an obstruction to the free passage of the fluid. In the case of water-mains, these objections to the internal coating do not apply. An external covering even, of this description, is of but little service on cast iron. Certainly it ought never to be employed as a means of hiding, or of remedying, defects of construction. Its use is simply intended to prevent or delay oxidation. In this respect it is of questionable benefit, as the greatest preservative of cast metal imbedded in the ground is the covering of oxide it acquires, in ordinary soils, after being a short time in use. This coating of oxide is impervious to moisture, and corrosive action thereafter entirely ceases.

These remarks on corrosion do not, of course, apply to circumcumstances of an unusual character. In laying mains through districts where chemical manufactories abound, or where furnace slag, clinker, dross, and ashes have been extensively used in filling hollows, repairing roadways, and in the formation of new streets, it is of the utmost importance that a supply of common soil should be provided in which to bed the pipes, and protect them thoroughly from the oxidizing action of the water percolating through the several materials, and holding in solution the acid bisulphides and other deleterious compounds that exert their corrosive influence on the iron. It is a matter of common experience, where this precaution is not observed, for the pipes to be so completely oxidized in a few years as to resemble plumbago more than iron, and so softened as to admit of the metal being easily cut with a knife.

The like effects are observed in pipes that have been for a length of time exposed to the action of soil impregnated with gas from leakages. In this case the surrounding moisture is rendered highly alkaline by the escaping gas; the gypseous constitutent of the earth is decomposed, and the liberated sulphur enters into combination with the iron, giving rise to active corrosion.

The oxide in the latter instances is of a different kind to that produced in ordinary soils through which rain water only percolates; its action also is continuous, owing to the several coverings partaking more of a scaly character, and not adhering firmly to the metallic surface.

The provisions of the following comprehensive specification for cast-iron gas-pipes are suitable to be adopted in the carrying out of a large contract:—

Specification for Cast-Iron Gas-Pipes, and other Castings.

The description and dimensions of the cast-iron pipes and other castings required to be furnished by the contractor are set forth in the specification and drawings, and approximations to the whole quantities that may be actually required are given in the bill of quantities.

Power to vary. The engineer shall, however, have power to vary, extend, or diminish, the stated quantities, weights, and dimensions of the pipes and other castings as the works proceed, without vitiating the contract, and the contractor shall have no claim, except for pipes and other castings actually ordered and delivered as calculated at the prices in the bill of quantities.

Description of Pipes and other Castings. The whole of the pipes and other castings are to be of the forms, dimensions, and thicknesses as figured, or as shown on the drawings, and as described in this specification, and in the accompanying bill of quantities; but should any discrepancies exist between the dimensions written on the drawings and the dingrams referred to, in all cases the contractor shall be regulated by the written dimensions in preference to the diagrams.

Pipes. All the pipes, whether straight, curved, taper or junction, must be made in every respect in exact accordance with the drawings, being true in sectional form, of equal thickness throughout, and having a smooth surface externally and internally.

Metal. The metal used in the pipes and other castings shall be such as will produce clean, sound, and strong castings, easily chipped or drilled, and it shall be free from air blows, sand holes, fire cracks, blisters, and every other imperfection or blemish.

Examining and Testing. A competent person will be appointed, either by the company (or corporation) or by the engineer, to examine, gauge, weigh, and test all the pipes and other castings prior to their leaving the contractor's premises, and the contractor must provide all the requisite weighing-machines, gauges, hydraulic presses, and all the labour requisite for this purpose, and must give the inspector every facility and assistance necessary for performing his duties in an efficient manner, and without unreasonable delay.

All pipes and other castings in which any imperfections may appear, or in which sand holes or air holes have been plugged up, will be rejected at once, and all that appear sound will be tested by hydrostatic pressure to 75 lbs. on the square inch.

Whilst under pressure, the pipes must be smartly rapped with a 4 lb. hammer from end to end, in order to discover any sandy, porous, or blown places, or other imperfections that are not otherwise discoverable. Any pipes that do not stand this test to the satisfaction of the inspector will be rejected, and must at once be removed.

Overweight allowed. The contractor must satisfy himself as to the correctness of the calculated weights as given in the bill. When lighter than these, the actual weight will be paid for, but no overweight of more than 4 per cent. will be allowed.

Mode of Casting. The pipes are all to be cast vertically in dry sand moulds, the bore and thickness being uniform throughout.

Joints. Pipes with bored and turned sockets and spigots to be formed as shown on the drawings. These must be accurately finished, and will be rigidly gauged by the inspector before being passed.

The sockets for lead joints must be of the form, depth, and width marked on the drawings.

Special Pipes. All special pipes will have sockets and spigots for lead joints; they must be cast accurately to the forms and dimensions given, and all bends, tees, and junctions must be well cleaned off, and left perfectly smooth inside.

Place of Delivery. The whole of the pipes and other castings are to be delivered in sound condition at the railway station. The prices quoted in the bill of quantities are to include the cost of delivery and other expenses connected therewith. The whole are to be delivered under the inspection of a person appointed and paid by the company (or corporation), and any pipes or other castings found to be broken, blemished, cracked, or otherwise unsound and imperfect, will be rejected by such inspector.

Time for Completion. The contractor shall deliver pipes and other castings in the order, at the times, and of the dimensions required for the work, according to the directions of the engineer, but the whole of the pipes and other castings shall be delivered within months from the date of the engineer's order to begin.

Time for Delivery. The engineer, having regard to the time fixed for completion as above stated, will arrange at intervals for the delivery of the pipes and other castings by giving fourteen days notice in writing to the contractor as to the lengths, diameter, number of pipes, bends, junctions, or other castings required; and the contractor must deliver the same in accordance with the terms of the notice so given; and in case the contractor shall fail or neglect to deliver any of the respective quantities within fourteen days from the date of such notices, he shall forfeit and pay for every week's delay afterwards elapsing, until such pipes and other castings are delivered, the sum of ten pounds sterling, as liquidated damages, and will be held responsible for all loss or damage that may be sustained by the company (or corporation) in consequence of the delay, or for which they may become liable from the non-fulfilment of contracts or works dependent upon such deliveries. In the event of such delay, the company (or corporation) shall be at liberty to contract with any other founder for the whole or any portion of the pipes and other castings required, and charge the excess of cost, if any, to the contractor, together with all expenses arising therefrom.

Payment. Payments will be made monthly, on the certificate of the engineer, equal to 90 per cent. of the net value of the pipes and other castings delivered.

A final payment of the sum in hand, subject to all legal and equitable deductions, as settled and certified by the engineer, shall be made within three months after the last of the pipes and other castings under the contract shall have been certified for as delivered.

The bill of quantities furnished to the contractor is only given to obtain an approximation of the cost of supplying the pipes and other castings which may be required. The final certificate of the engineer, on the completion of the contract, will, therefore, be made out irrespective of such bill of quantities, and

will be based upon the actual quantity of pipes and other castings supplied by the contractor, calculated at the prices tendered in the bill.

A monthly statement, showing the number and weight of the pipes and other castings supplied, to be sent in to the engineer.

No extra charges of any kind will be allowed, unless upon the certificate in writing of the engineer.

Legal Instrument to be Prepared and Signed. The contractor will be required to enter into a contract for the supply of the pipes and other castings, according to the foregoing conditions; and such contract deed will fix and specify a pecuniary penalty (not exceeding one-fourth the sum total of the tender) to be paid by the contractor in case the terms of the contract are not duly performed. The contractor will be required to sign the deed when tendered for that purpose.

Sureties. The contractor will also be required to provide two sufficient sureties to the satisfaction of the company (or corporation) to join him in a bond in a sum of money (to be fixed by the company) for the due performance and fulfilment of his contract. The bond and contract-deed to be executed at the same time.

Contractor to inform himself fully as to this Specification. Should there be any doubt or obscurity as to the meaning of any portion of this specification, the contractor tendering is requested to set forth the particulars of such doubt in writing, and submit the same with his tender, so that the question may be discussed by the engineer and the contractor, and, if necessary, be formally settled in writing before the contract is signed.

The contractor is requested to inform himself fully as to the several stipulations and conditions set forth; for, should any misunderstanding arise relative to the meaning of this specification during the progress of the contract, or after its completion, the decision of the engineer as to the true intent and meaning of any figure or figures, sentence or sentences, diagrams, &c., shall be conclusive and binding.

Forms Furnished. The tender and bill of quantities must be made out upon the forms furnished by the engineer, and be signed by a principal, or or by a declared agent acting on his behalf; and the whole of the requirements set forth in such printed forms must be complied with, or the tender cannot be received.

The tender so made out is to be sealed and endorsed with the words, "Tender for Cast-Iron Gas-Pipes and other Castings," and, together with the bill of quantities, must be addressed and forwarded to on or before the date named for the reception of the same, as set forth in the advertisement.

The company (or corporation) do not bind themselves to accept the lowest or any tender.

Parties tendering must do so at their own cost.

BILL OF QUANTITIES.

Number of Pipes.	Diameter of each Pipe in Inches.	Length of each Pipe in Feet.	Weight of each Pipe.			Price per Ton for Pipes.			Price per Ton for Special Castings.		
			Cwt.	Qrs.	Lbs.	£	s.	d.	£	s.	d.
300	16	9	9	1	..						
400	12	9	5	2	20						
500	10	9	4	2	6						
700	8	9	3	0	24						
600	6	9	2	1	15						
400	5	9	1	3	8						
300	4	9	1	1	13						

FORM OF TENDER.

To the *Company (or Corporation).*

of do hereby propose to supply the Cast-Iron Pipes and other Castings required, according in all respects to the true intent and meaning of the foregoing specification, and drawings accompanying the same, and subject to the terms and conditions set forth, at the prices named in the bill of quantities.

As witness my hand this day of

(Signed)

Correspondence.

BACK DIVIDENDS *VERSUS* RESERVE-FUND.

SIR,—Since my last letter, in which I referred to the Worcester New Gas Company's case, I have found time to look more into that case than I had been able to do before; I should, therefore, like to say a word or two respecting it.

There is a wide difference in the powers of the two Acts relating to back dividends, which, divested of all useless legal phraseology, are as follows:—

The Gas-Works Clauses Act—

Clause 30 provides that no company shall pay a higher dividend than 10 per cent., *unless a larger dividend* be at any time necessary to make up any previous deficiency in that rate.

Clause 31 provides that if, after paying a dividend of 10 per cent., and making up any previous deficiency, there should be any further profit, it shall be applied to the formation of a reserve-fund.

Clause 35 provides that if, after paying a dividend of 10 per cent., making up any previous deficiency, and completing the reserve-fund, there should be any further profit, it shall be applied to a rateable reduction in the price.

The Worcester Gas Act—

Clause 23 provides that the company shall *not* pay a higher dividend that 10 per cent., and if the profit exceeds that rate, it shall be applied to the formation of a reserve-fund.

Clause 26 provides that if, after paying a dividend of 10 per cent. and making a reserve-fund, there should be any further profit, it shall be applied to making a rateable reduction in the price.

Clause 28 provides that if the profits are not sufficient to pay a dividend of 10 per cent., such a sum may be taken from the reserve-fund as (with the actual divisible profits) will enable the company to make a dividend of 10 per cent. But in this clause there has been inserted in parentheses the following words, "whether such deficiency shall have occurred before or subsequently to the formation of such reserve-fund."

It will be seen from these quotations that the Gas-Works Clauses Act expressly authorizes the making up of any previous deficiency, and the paying of a larger dividend than 10 per cent., to give it effect; and that all the three clauses are consistent with each other in re-organizing these provisions. The Worcester Gas Act, on the contrary, is, with respect to two of the clauses referred to (23 and 26), altogether silent about making up any previous deficiency, and expressly *prohibits* the payment of any larger dividend than 10 per cent.; and the only power to make up any previous deficiency is contained in the words, "whether such deficiency shall have occurred before or subsequently to the formation of such reserve-fund," inserted in parentheses in clause 28.

If we disregard these words, all three clauses in this Act will be consistent with each other; but if we adopt them, and seek to give them effect, the consistency is destroyed, and the third clause becomes a *flat* contradiction to the two others, not only as respects the paying of a larger dividend than 10 per cent., but as respects the application of the reserve-fund, inasmuch as clause 23, which authorizes the formation of a reserve-fund, also provides for its appropriation, and does not contain these words.

It is a principle uniformly acted upon in the courts, that when there are powers in an Act of Parliament inconsistent with each other, and the meaning of one is precise and distinct, as clauses 23 and 26 in the Worcester Gas Act undoubtedly are, while that of the other is vague and uncertain, as clause 28 undoubtedly is, to give effect to the former in preference to the latter; whereas the contention in this case must have been for the court to sanction a proceeding precisely the reverse.

If the powers of an Act of Parliament are inconsistent with each other, and there is a possibility of working them without disturbing this inconsistency, the courts will hold that that is the course which ought to be adopted. In this case the carrying out of clauses 23 and 26 would not have contravened clause 28, but the carrying out of clause 28 would clearly have contravened clauses 23 and 26, and accordingly it was disallowed.

It is often said, in arguing these cases, that one clause overrides the other; but there is nothing to justify this. One Act passed at a later period than another, of the same character, may be held to override it; but with two clauses in the same Act there is neither law nor custom to give any greater force to one than to the other; every such case, as it occurs, must be dealt with separately on its own merits.

A word or two as to how this inconsistency in the Worcester Gas Act first arose may serve to clear away all doubt respecting its application to the provisions of the Gas-Works Clauses Act.

The Gas-Works Clauses Act was passed in 1847, and prior to that back dividends were unknown. As a matter of fact, back dividends were created by the Gas-Works Clauses Act.

The Worcester Gas Act was passed in 1846, and consequently it must have been drawn and deposited in the Private Bill Office of the House of Commons in December, 1845, when back dividends were unknown, and had probably never been heard of. It is, therefore, but reasonable to suppose that the bill was drawn without any intention of providing for back dividends, but that, during its passage through the House, the promoters became aware of what was in contemplation with respect to the Gas-Works Clauses Act, and the words in parentheses were interpolated in clause 28 to provide for back dividends, but that in doing this the necessity for altering the other clauses, so as to make them consistent with the alteration, was overlooked.

The meaning of clause 28, however carefully it may be read, is at best but very uncertain; nevertheless, if it had stood alone, it might have been held by the courts to cover back dividends, and to justify the paying of larger dividends than 10 per cent. for that purpose; but in the face of the two preceding clauses, expressly prohibiting a larger dividend than 10 per cent., and the clause which authorizes the formation of a reserve-fund, and provides for its application, not containing the words which are supposed to give this power, it is impossible to hold that it is sufficient to justify the paying of a larger dividend than 10 per cent.

In any event the clause would only justify the paying back dividends out of the reserve-fund, and could not, for that reason alone, even if there were no other, be compared with the Gas-Works Clauses Act; as this Act authorizes the paying of back dividends wholly irrespective of a reserve-fund or anything else, and, to my mind, actually prohibits the application of the reserve-fund to such a purpose.

The decision in this case is, for these and many other reasons, entirely special, and relates to the power of paying back dividends under the provisions of the Worcester Gas Act, and does *not* affect, in any way whatever, directly or indirectly, the power to pay back dividends under the Gas-Works Clauses Act.

W. LIVESEY.

Gas and Water Companies Association, 6, Victoria Street, Westminster, S.W., Dec. 2, 1876.

SIR,—I feel reluctantly compelled to encroach upon your valuable space, and to trouble your readers with a few brief remarks, especially as your correspondent accuses me of "changing my position." The correctness of this accusation I challenge your correspondent to support, for when the question was first raised I argued it as an abstract one, upon its legality (which your correspondent admits by his letter of the 11th of November). He now writes: "It is impossible to decide what is intended by an Act of Parliament by reference to one clause alone; you must study the Act in its entirety before you can do so; it is not possible to succeed at all times even then." I venture to think that if your correspondent had acted up to this opinion in the first instance, he would never have laid himself open to the charge of inconsistency. But whilst we have under consideration the accusation of "changing positions," let us see how your correspondent stands.

Vide his letter of Nov. 25:—

"Suppose the *reserve-fund to be full*, and the profit to be more than sufficient to pay 10 per cent., what then? May the *excess be applied to a reduction of the price, as provided for by clause* 35? That is the point we started from."

Vide his letter of Nov. 11:—

"The question upon which this discussion arose (as far, at least, as I have been concerned in it) appeared in your JOURNAL for the 26th of September last, and was: I will presume that most companies, who are in a position to pay back dividends, are under the provisions of the Gas-Works Clauses Act of 1847; and, if I correctly read the Act, it is imperative on such companies to pay all back dividends before they have the *power to make a reserve-fund*."

And I ask your readers if those two statements are in any way the same, and upon whose shoulders the "changing position" remains?

With regard to your correspondent's objection to my order of sequence, he writes: "If, therefore, the clause is to be acted upon in the order of sequence, as your correspondent argues, the back dividends must be made up before the current dividend can be paid, which it is impossible to suppose was ever intended." Your correspondent's deduction is as illogical as his premise is correct, for the Act only refers to making up back dividends—*after* the payment of maximum current dividends; and, therefore, the order of sequence, as stated in my last communication, remains intact, and will, I contend, solve the question.

4, *Skinner's Place, Queen Victoria Street, E.C.*, GEO. SANDELL.
Dec. 1, 1876.

INTEREST ON GAS DEPOSITS.

SIR,—In your remarks in the JOURNAL, No. 693, you observe upon the Liverpool Gas Company and other companies (not under the Gas-Works Clauses Amendment Act, 1871) not allowing interest upon deposits. I quite agree with you upon the propriety of doing so, although I do not agree with you that no more than 2½ per cent. should be allowed. When the companies are earning 10 per cent. on their own capital, it is unfair not to allow at least 5 per cent. upon capital advanced to them by their consumers. With the mass of these depositors (fishmongers and costermongers), with £1 capital of their own employed, and going about with their barrows, and with their own hard work added, they will earn 10s. per day on their capital, or £150 per annum on their single £1, or 15,000 per cent.

It is singular that there are now, and always have been, no persons so impracticable as gas managers. They are so utterly destitute of "tact" that they never can see a question of "policy" before them; they run their heads against the first brick wall they can meet with, and (as I have seen it described about other parties) if they cannot find a brick wall to run their heads against, why, verily, they will *build* one, against which they may knock out their brains.

The Metropolis Gas Act provides that—

> "The nature and amount of the security shall be determined by a magistrate, or that it may be the prepayment of a sum of money, and that in the latter case the magistrate shall determine the interest thereon, to be paid to the consumer."

Now, let us follow the working of this in the Metropolis. In large public-houses and beer-shops, where there was not sufficient trade to pay the expenses, a guarantee security was given by the landlord brewer. In small shops, such as coal-sheds, greengrocers, chandlers shops, small private houses, rented at 12s. per week, a deposit of one winter quarter's gas-rent (£1) was demanded. The Christmas quarter was demanded on the 20th of January, and then called for over and over again until the 20th of March. A notice was then sent, that if the £1 was not paid within a week, the supply would be cut off. The consumer then either paid and remained, or he went away and came to the offices and paid 19s. 6d. due at Lady-day, claiming the return of his deposit of £1 in payment of his account, together with sixpence, half a year's interest at 5 per cent. on his deposit. Or the other way, he absconded, paying *nothing*.

Now, what matter can it be whether the bad debts were swelled up that extra sixpence, or the interest account?

In no case was more than one winter quarter's charge taken, and in every case the deposit money (if in hand) was credited at the expiration of three years.

I see no hardship in discontinuing the supply if payment is not made. With newspapers and periodicals the payment is required (often) one *year* in *advance*, and at the expiration of the time the supply is discontinued *without notice*. So likewise with every other article of consumption, as milk, bread, meat, grocery, &c.

EX-SECRETARY OF FORTY YEARS EXPERIENCE.

LIMERICK GAS UNDERTAKINGS.

SIR,—The secretary of the United General Gas Company seems to complain of unfair comparison, and in furtherance of his particular views, gives the last half year's profit and loss accounts of both undertakings, and states in his letter that his company have made a net profit of £493 2s. 1d., as against £167 18s. 4d. of the corporation; but I think, in his zealousness to defend his directors management, he tries to make a distinction without a difference; for, will he contend that the amount of interest (£339 13s. 6d.) paid by the corporation to the National Bank is not profit? For, as far as I can see, there can be no distinction in the present case between interest paid by the Limerick Corporation for a loan, and dividends paid by the United General Gas Company for its subscribed capital, as both are chargeable against the net profits of the undertakings. It would have been much more correct to say our company's profits are so much per cent. upon our paid-up capital, whereas the profits of the corporation have only been so much per cent. upon their borrowed capital; but, undoubtedly, as they now stand, the corporation have made a larger profit than the company. NESTOR.

Parliamentary Intelligence.

NOTICES GIVEN FOR PRIVATE BILLS (SESSION 1877) RELATING TO THE SUPPLY OF GAS, WATER, &c.

ALLIANCE AND DUBLIN CONSUMERS GAS (BRAY SUPPLY).—Purchase by compulsion or agreement of new lands for gas-works at Bray; construction of tunnels under Dublin, Wicklow, and Wexford Railway; power to lay down mains and pipes on railway; repair of Bray Dock; agreements and money powers for that purpose; application of company's funds and revenue; amendment of Acts.

ASHTON-UNDER-LYNE GAS.—Extension of works; compulsory purchase of lands; additional capital; amendment of Act.

ASHTON-UNDER-LYNE IMPROVEMENT.—Acquisition by corporation of undertaking of Ashton Gas Company; dissolution of that company; powers to corporation to supply gas, to acquire lands, &c.; improvement of borough; paving, lighting, and sewering same; recovery of costs thereof; disposal of superfluous lands; bye-laws; issue of debentures, debenture stock, and annuity certificates; further borrowing and other powers; alteration of existing and imposition of new tolls, rates, duties, and charges; amendment or repeal of Acts.

BATLEY CORPORATION WATER.—Revival of powers and extension of time for compulsory purchase of land for authorized works; alteration of water-rates and rents, and imposition of new rates; alteration and increase of borrowing powers; new provisions as to sinking-fund; capitalization of interest on money borrowed for works whilst same are unproductive; application of purchase-money for the share and interest of the corporation in the Dewsbury, Batley, and Heckmondwike Water-Works; confirmation of purchase by the corporation of Brownhill Mills, and power to sell same and apply purchase-money; amendment and repeal of Acts.

BISHOP AUCKLAND DISTRICT GAS.—Dissolution of Bishop Auckland Gas Company, Limited, and re-incorporation of its shareholders; capital, &c., of new company; defining limits of supply; vesting in new company of existing undertaking, and powers to maintain and enlarge the same; powers to acquire land by compulsion, and to construct new works; to acquire other lands by agreement, and to dispose of land and property not required for undertaking; to manufacture and supply gas and residual products; to lay down and maintain pipes, &c., and to break up streets; to acquire and use patent rights, &c.; to manufacture, purchase, hire, &c., gas-fittings, meters, &c.; to levy rates, &c.; to confer, vary, and extinguish powers, rights, and privileges; contracts with local authorities, &c., as to supply of gas; as to purchase of works, &c., of persons supplying gas within the limits; agreements with North-Eastern Railway Company; incorporation of Acts; and other purposes.

BLACKBURN BOROUGH, GAS, WATER, AND EXTENSION.—Abandonment of certain authorized water-works; construction of new water-works; purchase of lands, &c.; purchase of the undertaking of the Blackburn Gaslight Company; winding up and dissolution of that company; power to corporation to carry on that undertaking and to levy rates, grant annuities, and borrow money; incorporation and amendment of Acts; and other purposes.

BOLTON IMPROVEMENT.—Extension of municipal limits; extension of water and gas limits and of water powers; compulsory purchase of lands and property; alteration of existing rates and of expenses payable thereout; assessing, levying, and recovering of rates; alteration and extension of borrowing and other powers; sinking-funds; corporation accounts; amendments and repeal of Acts.

BRIDGWATER (CORPORATION) WATER.—Powers to construct water-works and supply water to Bridgwater and neighbouring parishes; to purchase lands by compulsion; levy rates; borrow money; repeal and amend Acts; and for other purposes.

BRIGHTON CORPORATION.—Extension of boundaries of borough, &c.; confirmation of purchase of undertaking of West Brighton Water-Works Company, Limited; amendment of Acts.

BRISTOL DISTRICT WATER.—Incorporation of company; construction of works; power to supply water to Bristol, Clifton, Avonmouth, and other places; power to take water and purchase lands; capital and borrowing; power to lay mains and pipes, &c.; tolls, rates, and duties; agreements with local authorities, &c.; repeal, amendment, and incorporation of Acts; and other purposes.

BRISTOL UNITED GAS.—Purchase of houses and lands; diversion of footpath; amendment of Act.

BROMSGROVE, DROITWICH, AND REDDITCH WATER.—Incorporation of company; construction of works; compulsory purchase of lands; supply of water to Bromsgrove, Redditch, and Droitwich, and adjacent places in the county of Worcester; power to levy rates and supply meters; agreements with sanitary authorities and other bodies; protection of works, &c., of company; incorporation of Acts.

BURSLEM LOCAL BOARD OF HEALTH.—Purchase of undertaking of the Burslem and Tunstall Gas Company; power to borrow money; confirmation of agreement, and other powers; amendment or repeal of the company's Act.

CARNFORTH DISTRICT WATER.—Incorporation of company; construction of water-works; power to supply water in the parishes of Warton and Bolton-le-Sands, in Lancashire; power to take water and purchase lands, to levy rates and make agreements with local authorities, &c.; repeal, amendment, and incorporation of Acts; and other purposes.

CARSHALTON GAS.—Dissolution and re-incorporation of the Carshalton Gas and Coke Company, Limited; maintenance, renewal, and extension of existing works for the manufacture and storeage of gas or inflammable air from coal, peat, oil, or other materials on land belonging to, or occupied by, the company; conversion, &c., of residual products; powers to purchase lands by agreement, to hold, &c., patent rights, to deal in gas or inflammable air, coal, &c., to manufacture, purchase, and hire, and to sell and let, &c., meters, fittings, and apparatus, to enter into agreements with local and other authorities, bodies, and persons, to raise further capital; arrangement of capital and other money powers; to levy and take rates, rents, and charges; to alter existing rights and privileges, and to confer other rights and privileges; provisions for amalgamation with the Croydon Commercial Gas and Coke Company; incorporation of Acts; and other purposes.

CHRISTCHURCH GAS.—Dissolution and re-incorporation of the Christchurch Gas Company, Limited; maintenance and extension of works; manufacture of gas; supply of gas to Christchurch, Holdenhurst, and Sopley, in the county of Southampton, Hampshire; increase and regulation of capital; power to levy gas-rates; contracts with local authorities; and other purposes.

COATBRIDGE GAS.—Dissolution of Coatbridge Gaslight Company and incorporation of new company; vesting undertaking and property of existing company in new company; power to supply gas; limits of supply; maintenance of existing gas-works; and construction of new gas-works; manufacture, storeage, and sale of gas and residual products; purchase of additional lands, and sale of superfluous lands; powers to lay down, maintain, alter, and renew mains and pipes, and to use and break up roads, streets, &c.; patent rights; manufacture and sale or hire of meters, fittings, &c.; power to levy rates, rents, and charges; agreements with local authorities and others; application of capital and funds of existing company; regulation of capital; additional capital and borrowing powers; incorporation and amendment or repeal of Acts; and other purposes.

COLNE GAS.—Dissolution of the Colne Gaslight and Coke Company and incorporation of new company, with power to manufacture and supply gas and residual products; powers to purchase by agreement, and to hold, sell, and lease lands and patent rights; to manufacture, purchase, hire, &c., meters, fittings, and apparatus; to enter into agreements with local and other authorities, bodies, and persons, and other powers; to levy and recover rates, rents, and charges; to increase and regulate capital; and other purposes.

CORPORATION OF LONDON (VARIOUS POWERS).—Amendment of The Gaslight and Coke Company's Act, 1876.

CROYDON COMMERCIAL GAS.—Extension of works; manufacture and storeage of gas and residual products; purchase of lands by agreement; additional capital; provisions as to number and qualification of directors, and quorum of meetings of directors; provisions for purchase of, or amalgamating with, the undertaking of the Carshalton Gas and Coke Company, Limited; contracts with local authorities; amendment of Acts; and other purposes.

CRYSTAL PALACE DISTRICT GAS.—Amendment of sec. 17 of the Crystal Palace District Gas Act, 1873.

DUBLIN IMPROVEMENT ACTS AMENDMENT.—Widening of streets in the city of Dublin, &c.; building clauses and provisions enabling the corporation to acquire, by compulsory purchase or otherwise, a piece of land at Stillorgan for the purpose of constructing an additional reservoir, or additional reservoirs for water thereon; and for other purposes.

DUKINFIELD AND DENTON LOCAL BOARDS OF HEALTH.—Purchase of Dukinfield Gas-Works; dissolution of gas company; new gas-works; purchase of lands by compulsion; supply of gas by local boards; joint committee; power

to sanitary authority of Haughton to join; levying of rates; borrowing of money; amendment of Acts; confirmation of agreements.

DUNDEE GAS.—Acquisition of lands, houses, and other property, compulsorily or otherwise; erection of new works; erection of houses and other conveniences; additional borrowing powers; rates and charges; repeal and amendment of Acts; and other powers and purposes.

EAST WORCESTERSHIRE WATER.—Incorporation of company for the construction of water-works for supplying with water Droitwich, Bromsgrove, Redditch, and other parishes and places in the county of Worcester; agreements with sanitary and other authorities and bodies; and other powers.

EDINBURGH AND DISTRICT WATER.—Alteration of site of Alnwick Hill Reservoir, and of the levels thereof; new powers of construction, with filter-bed and tank; diversion of conduits; abandonment of the said authorized reservoir and portions of conduits, and relinquishment of certain of the lands authorized to be taken; confirmation of agreement with proprietor of Liberton; power to make other agreements; application of existing borrowing powers: rates; amendment and repeal of Acts; other purposes.

EPSOM AND EWELL GAS.—Dissolution and re-incorporation of the Epsom and Ewell Gas Company, Limited; maintenance of existing works and erection of additional works for manufacture and storeage of gas or inflammable air from coal, peat, oil, or other materials; manufacture, conversion, &c., of residual and other products; power to purchase lands by agreement; to hold, &c., patent rights; to deal in gas or inflammable air, coal, &c.; to manufacture, purchase, hire, sell, let, &c., meters, fittings, apparatus, and other things used in connexion with the supply or consumption of gas; to enter into agreements with local and other authorities, bodies, and persons; arrangement of existing capital, and power to raise further capital by ordinary or preference shares, &c., and other money powers; to levy and take rates, rents, and charges; to alter existing rights and privileges; incorporation of Acts; amendment of Acts; and other powers.

FALMOUTH WATER.—New works; additional capital and other powers; amendment of Act.

GLASGOW CORPORATION WATER.—New works and acquisition of lands in the county of Renfrew; compulsory purchase of lands, easements, and servitudes; power to take water; to borrow further money; sinking-fund; incorporation of general Acts; amendment of Acts; and other purposes.

HANLEY (CORPORATION) GAS.—Power to Corporation of Hanley to purchase the Staffordshire Potteries undertaking of the British Gaslight Company, Limited; to supply gas in the Borough of Hanley and neighbourhood; to raise money and to levy and mortgage rates; power to corporation to transfer, and to other sanitary authorities to accept parts of purchased undertaking outside the borough; amendment of Acts relating to the corporation and the company.

HEYWOOD WATER.—Extension of catchment ground; additional reservoirs and works; alteration of provisions as to compensation water of Acts of 1846 and 1855; additional lands; additional capital; amendment of Acts.

KENT WATER.—Extension of limits of supply of company of proprietors of the Kent Water-Works; application within extended limits of powers of company's existing Acts, and of Metropolis Water Acts, 1852 and 1871; new works; purchase of lands; agreements with company of proprietors of Lambeth Water-Works; further money powers; amendment of Acts.

LEEDS IMPROVEMENT.—New gas-works; extension of limits of gas supply; powers to regulate plumbers and gas-fitters; further powers to borrow money for gas purposes; gas reserve and depreciation fund; new water-works; water-rates; prevention of waste, &c., of water; extension of limits of water supply; power to regulate plumbers and water-fitters; further powers to borrow money for water purposes; water reserve and depreciation fund; markets; incorporation of Acts; amendment of Acts; and other powers and purposes.

LEICESTER GAS.—Compulsory purchase of lands; new cuts and diversions of streams; new gas-works; extension of limits of supply; disposition of lands; additional capital; amendment of Acts.

LIMERICK GAS.—Incorporation of company; transfer to and vesting in company of gas undertakings of Corporation and United General Gaslight Company, and dissolution of that company; amendment of Acts.

LITTLEHAMPTON WATER.—Incorporation of company; construction of works and supply of water to the parishes of Leominster, or Lyminster, Rustington, and Littlehampton; compulsory purchase of lands; power to levy rates, tolls, &c.; power to local board to contribute.

LONDONDERRY GAS.—Dissolution and re-incorporation of company; maintenance of existing works; erection of new works for manufacture and storeage of gas or inflammable air from coal, peat, oil, or other materials; conversion, &c., of residual products; powers to purchase lands; to hold, &c., patent rights; to deal in gas or inflammable air, coal, &c.; to manufacture, purchase, hire, &c., meters, fittings, apparatus; to enter into agreements with local and other authorities, bodies, and persons; other powers; rates, rents, and charges; sale or lease of lands.

LONGTON CORPORATION.—Purchase of undertaking of Longton Gas Company; purchase of additional land; confirmation of agreement, and other powers; amendment or repeal of company's Acts.

LOUTH GAS.—Amendment or repeal of Act; reconstitution of company; regulation and increase of capital; capitalization of profits; and other matters.

LOWESTOFT WATER, GAS, AND MARKET.—New service reservoirs and water-works; purchase of land; provisions as to mains and pipes under the harbour, and premises of the Great Eastern Railway Company; increase of capital; reduction in number of directors; amendment of Acts.

MARYPORT DISTRICT AND HARBOUR GAS.—Borrowing powers; confirmation of purchase of gas undertaking; power to levy rates; maintenance of gas-works; sale of superfluous lands; application of money; sinking-fund; powers relating to harbour-fund; limits of supply; repeal and amendment of Acts.

MIDDLESBROUGH CORPORATION.—Redivision of borough into wards, &c.; powers to construct gas storeage works; agreements and confirmation of agreements as to lands for ferry, markets, manure depôts, and gas-works; exchange of lands; purchase of lands by compulsion and by agreement; alteration and extension of borrowing powers; new provisions as to sinking-fund and application of funds; incorporation and amendment of Acts; and other purposes.

NEWCASTLE AND GATESHEAD WATER.—Abandonment of Upper Swinburn Reservoir and other works; new reservoir and works in substitution therefor; purchase of lands and easements compulsorily and by agreement; amendment and repeal of Acts.

NEWCASTLE-UNDER-LYME BOROUGH EXTENSION AND IMPROVEMENT.—Extension of borough, &c.; power to corporation to purchase by compulsion or agreement the undertaking of the Newcastle-under-Lyme Gaslight Company, and for that company to sell their undertaking; maintenance of existing gas-works, and manufacture and sale of gas and residual products; dissolution of gas company; compulsory purchase of lands; extension of borrowing powers; payment of costs of Act; incorporation of Acts; amendment of Acts, and other purposes.

NEWPORT (MONMOUTHSHIRE) GAS.—Construction of additional gas-works in the parish of St. Woollos, Monmouthshire; purchase of lands, &c.; amendment of Acts.

NORTH CHESHIRE WATER.—Additional share and loan capital; alteration and repeal of sections 36 and 42 of North Cheshire Water Act, 1864; further provisions as to payment of water-rates in advance; amendment or repeal of Acts.

NORTH DOCK WARD (DUBLIN) GAS.—Incorporation of company; powers to supply gas within the limits of the North Dock Municipal Ward in the city of Dublin; purchase of lands by compulsion and agreement; construction of gas-works; manufacture and storeage of gas and residual products; powers to hold patent rights and licences, manufacture and deal in meters, fittings, and apparatus; levy of rates and charges; power to take easements and connect gas-works with certain railways; agreements with local authorities; power to sell to corporation; power to purchase mains, pipes, &c., from the Alliance and Dublin Consumers' Gas Company; confirmation of agreements; amendment of Acts; and other purposes.

NORTH-EAST WORCESTERSHIRE WATER.—Incorporation of company; construction of works; power to supply water to Droitwich, Bromsgrove, Redditch, and adjoining parishes and places; application of certain provisions of Railways Clauses Consolidation Act, 1845; compulsory purchase of lands; rates; meters; protection of works, &c., of company; sale or lease of surplus lands; agreements with sanitary and other authorities and bodies.

OVER DARWEN LOCAL BOARD OF HEALTH.—Improvement of the River Darwen; further powers as to cesspools, &c.; amendment of Darwen Water-Works Act, 1869, and other Acts; borrowing of money; levying of rates; and other matters.

PERTH WATER.—Alteration or repeal of Act; incorporation of commissioners; transfer to and vesting in the commissioners of existing water-works; new works; acquisition of lands; purchase of undertakings of the Bridgend of Perth Water Company, Limited, and of the Earl of Kinnoull; power to supply water; extension of limits of supply; power to levy rates and charges and to borrow money; other purposes.

RAMSGATE LOCAL BOARD.—Purchase of undertakings of Ramsgate Water Company, and of Isle of Thanet Gas Company, or of part thereof; powers to local board and those companies to make agreements; winding up and dissolution of those companies; powers to local board to carry on undertakings, to make gas, and to supply gas and water, to break up streets; power to local board to transfer, and to sanitary and other authorities to take parts of undertakings, and to carry on same, &c.; provisions for improving and regulating the supply, price, &c., of gas and water; imposing regulations and restrictions on Ramsgate Water Company and Thanet Gas Company; defining, altering, and limiting powers of those companies respectively with respect to charges for gas and water, capital, dividends, and other matters; imposition of penalties; regulations as to water-fittings, and other powers relating to the supply of gas and water; powers to levy rates and charges, to alter rates and charges, to grant annuities, to issue debentures, to borrow money; incorporation of Acts; amendment of Acts; and other purposes.

RAMSGATE WATER.—Alteration, amendment, and (if necessary) repeal and re-enactment of all or some of the provisions of 5 Wm. IV., c. 6; application of the Water-Works Clauses Acts, 1847 and 1863, to the company of proprietors of the Ramsgate Water-Works; re-arrangement and regulation of capital, and capitalization of moneys expended on undertaking out of revenue; additional capital; borrowing powers; purchase of lands by agreement; sale of water in bulk; regulations as to fittings; incorporation of Acts; and other purposes.

ROTHERHAM CORPORATION.—Extension of time for completion of works; powers for compulsory purchase; alteration of existing Acts with respect to domestic supply of water, &c.; amendment of Acts; and for other purposes.

SEVENOAKS AND WEST KENT WATER.—Incorporation of company; construction of water-works; supply of water; purchase of lands by compulsion; agreements with local authorities; purchase by agreement of undertaking of the Sevenoaks Water-Works Company, Limited; levy of rates; incorporation and amendment of Acts; and other purposes.

SITTINGBOURNE GAS.—Incorporation of company; powers to company to supply gas to the parishes of Sittingbourne, Murston, &c.; to purchase by agreement the Sittingbourne Gas-Works, and to hold, maintain, and enlarge, &c., or discontinue, gas-works and works for manufacture, &c., of residual products; to confirm agreements for purchase, &c., of said works, and to empower company to make other agreements with respect to same; to manufacture and store gas and residual products, &c., and to deal in same; to acquire by agreement, and hold, and to dispose of, land and hereditaments; to maintain, alter, renew, and to lay down, &c., mains and pipes, and to break up, &c., roads, &c.; to acquire and use patent rights, &c.; to manufacture, purchase, hire, &c., gas-meters and fittings, and to sell or let same; to levy rates, rents, and charges for gas, &c., and to confer, vary, or extinguish rights, privileges, and exemptions, &c.; contracts with local authorities and others for lighting, &c.; incorporation of Acts; and other purposes.

SOUTHEND GAS.—Dissolution of Southend Gaslight and Coke Company; incorporation and vesting in new company the undertaking of dissolved company; increase and regulation of capital; powers to supply gas in parishes of Prittlewell and Southchurch, in Essex; maintenance and improvement of existing, and construction of new gas-works; manufacture and storeage of gas and residual products; purchase of lands; powers to hold patent rights and licences; manufacture and deal in meters, fittings, and apparatus; levy rates and charges; agreements with local authorities; amendment of Acts; and other powers.

STAMFORD WATER.—Amendment, &c., of Local Act 7 Wm. IV., c. 20; removal of restrictions therein upon supply by the proprietor of the water-works; provisions for constant supply; regulations for preventing waste, &c.; fittings, penalties, fire-plugs, hydrants, &c.

STRETFORD GAS.—Power to maintain, improve, extend, and construct gas-works; to raise further capital; to amend existing Acts; and to incorporate Acts.

SUNNINGDALE DISTRICT WATER.—Incorporation of company; construction of works; supply of water to Sunningdale, Chertsey, Egham, Staines, and neighbouring places; compulsory purchase of lands; power to levy rates; incorporation of Acts; and other purposes.

THANET GAS.—Alteration, amendment, and (if necessary) repeal and re-enactment of all or some of the provisions of the company's Act of Incorporation (5 Geo. IV., c. 75); application of Gas-Works Clauses Acts, 1847 and 1871, to the company; limits of supply; additional capital; capitalization of moneys expended on undertaking out of revenue; borrowing powers; purchase of lands by agreement; incorporation of Acts; and other purposes.

THE GASLIGHT AND COKE COMPANY.—Amendment of The Gaslight and Coke Company's Act, 1876, with respect to the purity of gas supplied by the company; and other purposes.

TUDHOE AND SUNDERLAND BRIDGE GAS.—Powers to Weardale Iron and Coal Company, Limited, or to a new company, to manufacture and supply gas, &c., within township of Sutherland Bridge, and part of township of Tudhoe; levying of rates, &c.; power to break up roads, &c.; purchase, &c., of patent rights; agreements with local, road, and other authorities, companies, &c.; sale or lease of lands; application of funds by and further money powers to the limited company; constitution of separate undertaking of that company; dissolution and re-incorporation of limited company; transfer of their gas-works, &c., to new company.

TUNBRIDGE WELLS WATER.—Amendment of Act; new reservoir and works; compulsory purchase of lands; water supply; powers and regulations as to fouling and misuse of water; rates, rents, and charges; agreements with local authorities and others; borrowing powers; and other purposes.

UNITED GENERAL GASLIGHT COMPANY (LIMERICK UNDERTAKING).—Disso-

lution and re-incorporation of United General Gaslight Company; power to continue gas-works; to purchase land; to supply gas in Limerick and the neighbourhood; to raise further capital; to purchase or lease gas-works of, or to sell or lease gas-works to, the corporation; to levy rates, rents, and charges; other powers; power to corporation to raise money; amendment of Acts.

WAKEFIELD GAS.—Additional capital; purchase of land; construction of works for the manufacture of gas, and the manufacture and conversion of residual products; amendment, &c., of Acts.

WAKEFIELD IMPROVEMENT.—Power to the Corporation of Wakefield to purchase by compulsion or agreement, and to the Wakefield Water Company to sell, their undertaking; dissolution of that company; the corporation not to be compelled to construct works authorized by the Wakefield Water-Works Act, 1876; extension and enlargement of borrowing powers; creation of debenture stock and permanent debt; payment of costs of Act; amendment and incorporation of Acts; and other purposes.

WARRINGTON CORPORATION GAS.—Purchase by, and transfer to, the Corporation of the undertaking, property, powers, and privileges of the Warrington Gaslight and Coke Company; power to maintain and enlarge gas-works and supply gas; borrowing of money; rates, and assessments; powers to contract with local authorities; amendment and incorporation of Acts; and other purposes.

WATERFORD GAS.—Power to create further capital; classification and definition of capital; increase of illuminating power of gas; power to corporation to purchase works; amendment of Act.

WEST SURREY WATER.—Extension of limits of supply; additional capital; borrowing powers; levying of rates; amendment of Acts; and other purposes.

WOOLWICH, PLUMSTEAD, AND CHARLTON CONSUMERS GAS ACT AMENDMENT.—Increase of capital; amendment of Act.

YORK CITY WATER.—Power for Corporation of York, or the York New Water-Works Company, or a new company to be incorporated, to establish and carry on water-works, construct reservoirs and other works, purchase lands, and supply water; vesting of undertaking of York New Water-Works Company in corporation or a new company; dissolution of existing company; extension of powers; power to levy rates and raise money; repeal and amendment of Acts.

NOTICES OF APPLICATIONS TO THE BOARD OF TRADE (SESSION 1877) UNDER THE GAS AND WATER FACILITIES ACT, 1870.

ABINGDON GAS.—Powers to continue, maintain, and enlarge gas-works, and to supply gas and residual products to Abingdon and other places in the county of Berks; power to urban sanitary authority to purchase or lease the undertaking; power to raise additional capital, rates, &c.

BRIDPORT WATER.—Additional capital; amendment of Act.

BROTTON AND LOFTHOUSE GAS.—Powers to maintain, continue, and enlarge gas-works; additional land; limits of district; power to manufacture gas and break up streets; additional capital; levying of rates; and other purposes.

BURGESS HILL AND ST. JOHN'S COMMON WATER.—Powers to lay mains and pipes in the parishes of Clayton and Hurstpierpoint, and to supply water in the parish of Hurstpierpoint; to take rates; to increase capital; and to amend previous order.

CRANLEIGH GAS.—Powers to maintain and continue works for the manufacture and storeage of gas and residual products at Cranleigh, in the county of Surrey; limits of district of supply; power to lay mains and pipes, and to break up streets and roads, and to levy rates and charges; additional capital; incorporation of Acts; and other purposes.

GUISBROUGH GAS.—Powers to maintain the existing gas-works; to define district of supply; to manufacture, store, convert, &c., gas and residual products, &c.; to acquire and use patent rights and licences; to fix and regulate capital and price of gas; to manufacture or purchase, and to sell or hire gas-meters, fittings, &c.; to levy rates, rents, and charges for gas and meters, &c.; to lay down pipes, &c.; to break up streets, &c.; contracts with local authorities and others; as to transfer of undertaking to local board; incorporation of Acts; and other purposes.

HAYLING ISLAND GAS.—Power to erect and construct buildings, and the necessary plant, mains, services, and all other matters incident to the manufacture and distribution of gas in and for Hayling Island.

HORSHAM GAS.—Powers to maintain gas-works; limits of district; power to manufacture gas, break up streets, levy rates; and other purposes.

ILKESTON GAS.—Maintenance of existing gas-works; manufacture and storeage of gas and residual products; limits of supply; levy of rates and charges; regulation of capital; additional lands.

MANSFIELD GAS.—Additional capital.

NEWCASTLE-UNDER-LYME GAS.—Additional capital; arrangement of capital; amendment of Act.

NORTH CAMP AND FARNBOROUGH DISTRICT GAS.—Powers to construct and maintain gas-works within the parish of Farnborough in the county of Southampton, and to supply gas within the said parish, and in the adjoining parish of Ash, otherwise Ash and Normandy, the chapelry of Frimley, and the tithing or hamlet of Tongham, in the parish of Seale, all in the county of Surrey; to lay mains and pipes; to break up streets; levy rates and charges; incorporate Acts; and other purposes.

PICKERING GAS AND WATER.—Powers to construct gas-works and water-works, and to manufacture and supply gas, and to supply water within the township.

RUTHIN WATER.—Additional capital.

SOUTHBANK AND NORMANBY GAS.—Extension of limits of supply; purchase of lands; enlargement of works; laying of mains and pipes; levying and alteration of rates; contract with local authorities; definition and increase of capital; regulations and provisions with respect to price and dividends; incorporation of Acts; and other purposes.

STAFFORD GAS.—Additional capital; incorporation and amendment of Acts; and other purposes.

STONE WATER.—Authority to construct water-works, and to supply water to the town of Stone and other places, in the county of Stafford.

WIMBORNE MINSTER GAS.—Maintenance of existing gas-works; manufacture and storeage of gas and residual products; limits of supply; levying of rates and charges; regulation of capital; additional lands.

WIMBORNE MINSTER NEW GAS.—Power to construct and complete new gas-works for the town of Wimborne Minster, &c.

NOTICES OF APPLICATIONS TO THE LOCAL GOVERNMENT BOARD (SESSION 1877) UNDER THE PUBLIC HEALTH ACT, 1875.

ATHERTON LOCAL BOARD.—Power to construct additional works for the manufacture and storeage of gas; and other purposes.

BISHOP AUCKLAND LOCAL BOARD OF HEALTH.—Powers for a gas undertaking, and to purchase the existing gas-works; to manufacture and supply gas throughout the whole or any part of the district; and to borrow money for these purposes.

RYDE BOROUGH.—Powers to purchase and take, otherwise than by agreement, certain lands, buildings, mill, lands covered with water, watercourses, streams, springs, and other hereditaments; to make and maintain pipes, mains, reservoirs, and other works.

SILSDEN GAS.—Powers to purchase and supply gas within the district of the Silsden Local Board; and for other purposes.

WALLASEY LOCAL BOARD.—Powers to extend works for the manufacture and storeage of gas and conversion of products; to extend the time for constructing a reservoir for the storeage of water; to acquire additional lands by compulsion or agreement; to exchange land; to raise money for gas, water, and ferry purposes.

YNYSCYNHAIARN LOCAL BOARD.—Powers to purchase the undertaking of the Portmadoc Gas Company, Limited; to confirm agreement; to manufacture and supply gas within the district of the Ynyscynhaiarn Local Board, and to levy rates and charges; incorporation of Acts; and other purposes.

Miscellaneous News.

RATING OF THE SOUTHAMPTON GAS-WORKS.

(*In Arbitration—Before* G. POWNALL, *Esq.*)

SURVEYORS INSTITUTE, GREAT GEORGE STREET, WESTMINSTER.

MONDAY, MAY 22, 1876.

SOUTHAMPTON GASLIGHT AND COKE COMPANY, *Appellants*, *v.* THE GUARDIANS OF THE POOR OF THE SOUTHAMPTON INCORPORATION, *Respondents*.

Mr. BARROW and Mr. CASTLE appeared for the appellants; and Mr. M. WHITE, Mr. BULLEN, and Mr. TEMPLE COOKE for the respondents.

Mr. BARROW, in opening the case for the appellants, said the appeal was against a rate made for the relief of the poor of the Southampton Union on the 5th of July, 1875, and he believed it would be found that the difference between the parties depended mainly upon the question of the figures which were to be taken into consideration for the purpose of calculating the rateable value. The arbitrator was aware of a decision in the London, Brighton, and South Coast Railway case, reported in Vol. xv. of the Queen's Bench Reports. In that case the company, after the latest period at which the accounts had been published, but before the rate had been made, had increased their capital from £260,000 to £350,000, and they claimed to be allowed interest in the making of the rate upon the £350,000, that being the state of the capital at the time the rate was made, although not the state of the capital as it appeared in the latest published accounts. Having said that much, the only remaining point turned upon the narrow question of up to what date the overseers ought to have made their calculations in regard to the assessment of the company, and it was held that the overseers, in making a prospective rate, were to make it upon the supposed prospective value, ascertained as well as they could, from the latest evidence in their power antecedent to the making of the rate. He (Mr. Barrow) gathered from that that the latest published accounts were to be taken, subject to those accounts being corrected by any information that could be obtained as to any facts existing before the rate was made. The annual accounts of the company were made up to and balanced every year to June 30, but of course those accounts could not be balanced and published for some two or three months afterwards. The latest accounts, therefore, which would apply to the rate in question were those for the year ending June 30, 1874; but there was other information which the respondents could have obtained—viz., the accounts for the half year ending December 31, 1874. The company had therefore taken the figures for the half years ending June 30, 1874, and December 31, 1874, and they said those were the figures which ought to govern the rates made until the accounts for the next half year were available. In the case of the Abney Park Cemetery there was a point to which he wished to direct attention—viz., that the rateable value was wrongly assessed. In dealing with that case Justice Blackburn said: "The Parochial Assessment Act has provided that the basis of rating shall be the rent at which the property was let from year to year, and though it may be more agreeable that it should be for a term of years, the Legislature has decided otherwise, and takes, as a basis, the rent which a tenant would from year to year give. No injustice would be done if the company are rated in every year according to the value which the hypothetical tenant will give for the occupation in the preceding year; and according to this rule the company's receipts would govern the rateable value of the cemetery in the next year;" so that taking the latest year they were able to get at, and adopting that part of the London and Brighton case which said they were to take into account the latest information that could be reasonably arrived at, the company said that the year beginning Jan. 1 and ending Dec. 31, 1874, would be the correct one to take. He (Mr. Barrow) would state what he believed to be the reason why the respondents contended that the application of that rule in the present case would lead to a fallacy. The year 1874 was one of famine prices so far as coal was concerned, and there was no doubt that in that year the company paid a high price for their coals. Their contracts were made from the 1st of July to the 30th of June following, and there was no doubt that before the making of the rate on the 5th of July fresh contracts had been made which would govern the year 1875, and which would enable the company to obtain their coal very much cheaper. The proposition of the respondents, as he understood it, was to take the receipts in 1874 and the account of the coal burnt in 1874 to earn those receipts; but they proposed to attach to that account the price of coal in the year 1875; but that was a fallacy for two reasons. In the first place, let them put themselves in the position of the hypothetical tenant who took those works on July 1, 1875, and see what he would calculate upon. He certainly would never calculate upon a profit based upon the receipts of 1874 and the coal expenditure of 1875, for the simple reason that everybody knew that when the price of coal was high the price of gas was high, and the receipts were in proportion, but when the price of coal was low the company were expected to reduce the price of gas; and therefore no tenant, on taking the works on July 1, 1875, and endeavouring to ascertain what he could reasonably give as rent for those works, would be such a fool as to suppose he could have the receipts of 1874 and the expenditure of 1875, because he would know he would have to reduce the price of gas. There was also another argument which appeared to be quite conclusive; the rates were made four times a year—in July, October, January, and April; but they were then only dealing with the July rate, and he (Mr. Barrow) contended that the rate for October was the first in respect of which the new calculation could come in, because in July the company were using coal they had in store on the 30th of June and which had been delivered under the old contracts at high prices. The price of gas had not in fact been reduced until March of the present year, though it would probably have been reduced before but for the expense of the litigation in which they were engaged. The witnesses to be called for the company would confine their figures to the year 1874, and any attempt to introduce any other figures would be strongly objected to. It was manifestly absurd to take the receipts obtained when coals were high, and put against them the expenditure when coals were low, and say those were the figures which a tenant should take into consideration, and that was the principle upon which the rate was to be calculated.

Mr. BULLEN said that all his figures would be based upon the revenue of the company up to June 30, 1875.

Mr. CASTLE said he should like to say a few words upon the question of law.

The ARBITRATOR said he could not determine a question of law if the learned counsel differed.

Mr. BARROW said the reference was expressly with the view that the arbitrator should state for the Court of Queen's Bench any questions of law which the parties might desire; and it occurred to him that the only way in which the case could be properly sent to that court would be by stating alternative figures.

Mr. BULLEN said he should ask the arbitrator to give a finding one way or the other, leaving the alternative figures to be dealt with hereafter. It might possibly happen that the figures would be such as to leave no ground for a case here-

after, and therefore it was of importance a decision should be given upon the point at once.

Mr. BARROW: But still the alternative figure has to be found.

Mr. CASTLE said the old principle of rating, as he understood it, was laid down by the Act passed in the reign of William IV.—that a calculation was to be made of the rent which a tenant could be reasonably expected to give year by year—and that always struck him as being the fairest way of determining the matter. If that was admitted, the question then was, what information could be obtained, and it would be at once seen that the only accounts possible on the 5th of July, 1875, would be those published up to Dec. 31, 1874, because those published as on June 30, 1875, although five days before the rate was made, could not possibly have been prepared, the register of the meters not having been taken, and the calculations not having been gone through. It would therefore be contrary to the meaning of the Act to admit any information which could not have been before the guardians when they made the rate, or before the Assessment Committee when they heard the case, or could have been before any tribunal if the appeal had come on at once.

Mr. BARROW: I do not know if you are aware they are under a private Act at Southampton?

Mr. BULLEN said the remarks made by Mr. Castle were exactly his point. He thought that the common-sense aspect and the legal aspect of the case should go together. He would deal with the question of the hypothetical tenant, and would ask, as a matter of common sense, whether anybody about to purchase would do so without thoroughly investigating, not what the doings of the previous year were, but also what was doing at the time he was negotiating. The company's financial year ended on the 30th of June; the rate was made on the 5th of July; and the guardians had to calculate the rate upon the basis of what the hypothetical tenant would give for the business then being carried on. In the present instance the company were requested to give the particulars as they appeared in their books up to the 30th of June, but they declined to do so.

Mr. BARROW: They could not.

Mr. BULLEN said he apprehended that a company like that, if their business was properly carried on, could not pretend to say that, on July 5, 1875, they could give no information whatever from their books which did not go beyond June 30, 1874.

Mr. CASTLE: The 31st of December.

Mr. BULLEN said he was taking the published accounts. There was no published account for December, and the company said they would not give access to anything which would enable the guardians to arrive at the real value of the business to be purchased on July 5, 1875.

Mr. BARROW said no application was made for those figures till December, 1875—six months after the rate was made.

Mr. BULLEN said his learned friend had stated that at the time of making the rate the company had upon their premises a large quantity of coal which they had bought at the high and exceptional prices of 1874, but how would that affect the incoming hypothetical tenant? It must be remembered the rate was prospective, and made upon a prospective basis. Would the hypothetical tenant be such a fool as to buy coal at past prices, or the price at which they actually stood when he took over the plant. He would take over the concern and buy coal at the price at which the market then stood, and he would not be bound to do more. In the London, Brighton, and South Coast case, if he gathered aught from his learned friend it was said that the overseers were to take the actual value of the property down to the making of the rate, and further that they were to be guided by the latest information accessible to them.

Mr. BARROW: They would be entitled to any fact existing at the date of the making of the rate.

Mr. BULLEN said that being so, could it be maintained that on the 5th of July the information upon which they subsequently issued their revenue account for the year ending the 30th of June previous was not then existing and accessible, if they had chosen to make it so, to the guardians? But in that same case he thought his learned friend could find, according to the judgment of Justice Coleridge, that the overseers in making a prospective rate were to make it upon the supposed prospective value ascertained by them from the latest evidence in their power as to antecedent value. It would have been a very easy thing for the company to have ascertained at that moment what they had given for coal, because their contract would show it. The judgment went on to say that if the sessions could be put in possession of any fact in existence before the rate was made, and though it was not the absolute duty of the company to volunteer information, if it would approximate more nearly to actual accuracy they were to amend the rate accordingly. The arbitrator was in the position of those sessions, and there would be placed before him the company's own published accounts, stating what their actual revenue was up to the time when the guardians were entitled to make a rate, and he would be asked whether he did not think that the hypothetical tenant, intending to purchase the business, would not have had every source of information opened to him by the vendor. The company were not obliged to give that information, but now that the guardians had it they were bound to act upon it.

Mr. BARROW: I have only one word to reply to my learned friend. First with regard to this question——

The ARBITRATOR: I would ask, before you reply, what is the practical difference? The price of gas, I understand, is regulated by the price of coal. If coal is high, the price of gas is high; if it is low, the price is low; but surely the hypothetical tenant would not only look to the past, but would look to the future?

Mr. BARROW: I quite agree with you; but what my learned friend purposes to do is to take the high prices of 1874 and balance them with the low prices of 1875.

Mr. BULLEN: I do not, indeed. We take the last published balance-sheet up to June 30, 1875, and for that year we take their entire revenue account, and we say, "We will assess you upon your own figures."

Mr. BARROW said the accounts were not published, they were not even in the books.

Mr. BULLEN: We say these accounts, which must, to a great extent, at all events, appear in the books, show the actual value of the property, and what the occupation value would be to the hypothetical tenant.

The ARBITRATOR: For the next year, 1875?

Mr. BULLEN: Yes; 1875-6.

Mr. BARROW said that when they were before the Recorder his idea certainly was that the guardians were going to take the high receipts of 1874 and place them against the expenditure for coals in 1875.

The ARBITRATOR: I should have no difficulty in determining that that was unfair.

Mr. BARROW said his opponents had now altered their tactics, and said that, for the purposes of the rate made on July 5, 1875, they would take the figures which actually did not exist at that time. At that date the meters had not been taken, and it was therefore absolutely impossible that they could have had the information which his learned friend sought to import into the case. They could not call upon the parish officers on the 5th of July to make a rate by prophecy. They could not tell on the 5th of July what would be the balance that was to guide a tenant in the rent he would give. They could not tell that till three months afterwards. It might be very well when they made the October rate; but how on earth could they claim to say, "We now, on the 5th of July, have a right to make a rate for so much," because three months afterwards it turned out that certain figures were in existence which they thought supported their view, was a matter he (Mr. Barrow) could not conceive. The overseers, in making the rate, were to make it upon the supposed prospective value ascertained by them, as well as they could, from the latest evidence in their power on the 5th of July. Could any human being contend that a state of things which was not known till Sept. 30—three months later—was applicable? In the Abney Park Cemetery case, Justice Blackburn said very truly that the overseers were to make their rate according to the existing state of things, but in the same breath he added, "How is the existing state of things to be ascertained when the evidence of it is not in existence, and could not be in existence for some time?" There must be some time when the parish officers would have the information available for rating purposes. It so happened here that they had a fixed period of time; but further the company said that the 30th of March, 1875, when the accounts up to December, 1874, were first made available, would rule the rating from that time up to about the 30th of September, when the June accounts came out. Then, again, those accounts would rule during the winter months, up to about March, when the December accounts would, in their turn, be available, and so on, adding half year to half year; and that was what Justice Blackburn laid down to be the proper rule in the Abney Park Cemetery case.

The ARBITRATOR: But would the profits materially differ? It is said by Mr. Bullen that he does not contend for high prices and low receipts, or low prices and high receipts. Does not the price of coal affect the price of gas?

Mr. BARROW: I believe it would be found that it would make a difference of nearly £2000.

Mr. CASTLE: The reduction made by the directors did not take place until March.

The ARBITRATOR: A real tenant, supposing the gas company were going to let their works, would clearly look to the future as well as at the past.

Mr. BULLEN: So far as I can learn of the facts of the case, all this argument is to some extent futile, for these reasons: The guardians have made a rate without the information which my learned friend has since been obliged to furnish to the clerk of the peace. We now have that information. Whether my learned friend says it should be the basis of a rate or not I do not care, but I say that, if that further information does support the rate, we are right.

Mr. BARROW: That is to say, the guardians may make a shot at anything they please, and if it turns out three months afterwards that the information they obtain justifies them in making such a rate, that is to pull them through.

The ARBITRATOR: Why not? Supposing you were content with the assessment, you would not then require the parish to tell you how the assessment was made. I do not think the mere fact that they made a shot, and shot right, would do you any harm.

Mr. BARROW: The point is, have they a right in July to take into consideration facts which at that time were not available?

The ARBITRATOR: My impression is that a surveyor, in advising a tenant, would clearly look to the future.

Mr. BARROW: The information was not available when the rate was made; and, as with regard to this particular rate the difference will amount to £2000 in the rating, we of course shall stand on the strict law.

The ARBITRATOR: When I hear the respondents case you will object to any information they put before me founded upon accounts not published or unknown in July.

Mr. BARROW: I shall make a formal objection in order to put me right. I suppose in making your award you will find an alternative—that if the accounts to December 31, 1874, are the accounts to govern the matter there will be one thing, and if the accounts are to be those to June 30, 1875, there will be another, and it will be for the Court of Queen's Bench to decide.

Mr. BULLEN said he should examine and cross-examine to show the position of the company from June, 1874, to June, 1875, and having done so he should ask the Arbitrator to find what was the rateable value on July 5.

The ARBITRATOR: Founded upon information obtained subsequently.

Mr. BULLEN: To a certain extent. The company will not deny there were the accounts made up quarterly. They gave us no information, and if we make a shot in the dark, and it happens to hit the mark, I say we are justified in the rate we made.

The ARBITRATOR: I shall accept Mr. Barrow's suggestion that I should make alternative figures, and then take the opinion of the court upon it.

Mr. BULLEN: The only thing will be that you should understand our position. We have made our calculations upon what has now come to our knowledge of the exact state of the accounts, but we have not come here with calculations upon the accounts for 1874. That, therefore, will simply prolong the inquiry a little.

The ARBITRATOR: With the understanding that if an alternative award should be made I shall hear any evidence.

(To be continued.)

PURCHASE OF THE WARRINGTON GAS-WORKS.

A Meeting of the Ratepayers of Warrington was held on Thursday evening last, in the public hall—Mr. J. CROSFIELD in the chair—"to protest against the exorbitant terms which have been conceded to the Warrington Gas Company by the Corporation."

After a long address from the CHAIRMAN,

Mr. JOHN PIERPOINT proposed the following resolution:—"That this meeting, while prepared to approve of the acquisition of the gas-works by the corporation at a fair and reasonable price, is of opinion that the terms of the purchase, as at present arranged, are unreasonable and excessive, and that the purchase of the gas-works under such conditions is not one which will be conducive to the interest of the borough; and that this meeting accordingly pledges itself to oppose the action of the Town Council in seeking to obtain an Act of Parliament to sanction the purchase."

Mr. J. LEA seconded the motion, which was supported by Mr. NICHOLSON.

Mr. MONKS moved as an amendment—"That the terms of the purchase, as arranged between the corporation and the gas company, are both fair and reasonable."

Alderman BURGESS seconded the amendment, which was negatived.

The original motion was carried by a large majority.

A resolution was also adopted requesting the chairman to attend the statutory meeting summoned by the mayor for the next day, and in case at such meeting a resolution should be passed authorizing the council to obtain an Act of Parliament as proposed by them, to demand a poll of the general body of ratepayers and property-owners of the borough.

The proceedings closed with a vote of thanks to the chair.

The meeting convened by the mayor was held on Friday, when his worship presided, and proposed the first resolution, which was to confirm the resolution passed by the Town Council on Oct. 31, 1876, authorizing the purchase of the Warrington Gas-Works.

Alderman HOLMES (chairman of the Finance Committee) seconded the motion.

Mr. CROSFIELD (chairman of the ratepayers meeting held on the previous day) wished to propose an amendment, but—

The MAYOR ruled that no amendment could be moved, and that those who dissented from the motion could only express their opinion by voting in the negative.

After a great deal of warm debating, the question was put, when a very large majority voted against the resolution.

Alderman HOLMES then demanded a poll on behalf of the corporation.

The proceedings closed with a vote of thanks to the mayor for presiding.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Ordinary Meeting of Proprietors was held at the Terminus Hotel, Cannon Street, London, on Tuesday, Nov. 28—JULIAN GOLDSMID, Esq., M.P., in the chair.

The SECRETARY (Mr. Albert F. Jackson) having read the notice convening the meeting, the chairman affixed the corporate seal to the register of proprietors. The secretary read the following report:—

The present half-yearly ordinary meeting of the shareholders has been convened agreeably to the company's Act of Parliament for the purpose of receiving a report from the president and directors upon the affairs of the association, and for declaring a dividend for the half year ended the 30th of June last.

Gas Made.—The total quantity of gas made at all the stations in the half year ended the 30th of June last was 2477 million cubic feet. The total quantity made in the corresponding half year of 1875 was 2610 million, being a decrease of 133 million, or at the rate of 5·12 per cent. But, as the diminution at Brussels and Bordeaux was 244 million, the remaining establishments show an increase of 111 million cubic feet.

Lights.—The total number of lights at all the stations on the 30th of June last was 1,111,399. The total number of lights on the 30th of June, 1875, was 1,110,927. These figures show an increase of 472, or at the rate of 0·04 per cent. The lights at Bordeaux are included in both cases.

Mains.—The total length of mains laid up to the 30th of June last was 1148 miles. The total length of mains on the 30th of June, 1875, was 1196 miles, being a decrease of 48 miles.

The works and apparatus at the several cities and towns lighted by the association were, during the period now under review, in thorough repair and good working order, and sufficient for all requirements.

As heretofore, Mr. G. W. Drory has, with the assistance and co-operation of the engineers and agents at the several stations, ably superintended the conduct of the business, and of the affairs of the association on the Continent.

The rental for the half year ended the 30th of June last, 1876, was less than in the corresponding half year of 1875; but, as there was during the period now under consideration a diminution at Bordeaux and Brussels, the rental at the remaining establishments really showed a fair increase.

The profit made in the half year now under consideration was larger than that for the corresponding half year of 1875.

The cost of the coal used in the half year now under review was 2s. 6d. per ton less than that of the coal used in the first half year of 1875.

Secondary Products.—The value of the secondary products—coke, tar, and ammonia—shows a satisfactory increase.

For the half year under consideration a large outlay has been incurred on the construction of new apparatus, and on necessary alterations to the premises at Aix-la-Chapelle, Frankfort-on-the-Maine, Haarlem, Brussels, Berlin, and Vienna.

Additional mains of various sizes, and in quantities more or less considerable, have also, at a large outlay, been laid at Frankfort-on-the-Maine, Hanover, Antwerp, and Vienna.

Expenditure on account of land was, during the half year ended the 30th of June last, incurred at the following stations—viz., Vienna, Lille, and Hanover.

At Bordeaux the amount of the expert's valuation of the works, mains, and property of the association was paid by the "Société Financière" on the 1st of April last, and possession of the said works, &c., was given up by the association to the new Bordeaux Gas Company on the 17th of that month.

At Brussels, the balance alluded to in the last report as still due from the town authorities to the association under the award of the experts, not having been paid in accordance with the judgment delivered in the Court of First Instance, a citation calling upon those authorities to comply with that judgment was on the 13th of May last served upon them. To that citation they entered an appearance in court in the month of June last, and the matter remains for future settlement.

At Vienna, contracts were in the half year concluded with the suburbs of Hernals, Ober, and Unter-Döbling, Ottakring, Neulerchenfeld, and Nussdorf.

At the last half-yearly general meeting a shareholder gave notice of his intention to propose at this meeting that the remuneration of the directors should be increased, which notice received the general approval of the shareholders, and will be considered at the present meeting.

In conclusion, the president and directors desire to draw the attention of the shareholders to the accounts for the half year ended the 30th of June last.

These have been duly audited, and from them the directors have, in accordance with the provisions of the Companies Clauses Consolidation Act, prepared a scheme showing the profits of the association for the last half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—namely, a dividend of £2, and a bonus of 10s. per share, payable free of income-tax, on and after the 15th of December next.

The CHAIRMAN: Gentlemen, before I call your attention to two or three important matters which are noticed in the report, I think you will like to be informed of several things that have occurred with regard to the association since the last half-yearly meeting, and which do not so immediately affect the questions raised in the report. And before I advert to those matters, I am requested to state to you that our president, Sir Moses Montefiore, regrets very much that he is not able to attend here to-day, in consequence of not being well. At the same time, in writing to inform me of this fact, he says this: "As I cannot have the pleasure of personally congratulating the meeting on the success which has attended the association during the last half year—the 51st year since its establishment in March, 1825—may I request you kindly to convey to the proprietors my regret at being absent on the occasion, assuring them that nothing but the present state of my health would have prevented my attendance." I am sure we are all sorry not to see Sir Moses Montefiore here to-day. Then I am anxious the shareholders should know that, notwithstanding the contrary desire which all his colleagues felt, and which none felt more than myself, Mr. Twells has insisted upon carrying into effect an intention, which I regret to say he has expressed for more than two years, of resigning the deputy-chairmanship of the association. And though I think many of my colleagues more competent to have undertaken the task, I have, at their request, accepted the deputy-chairmanship, and that is the reason why I appear before you in this capacity to-day. I think it is only right that this explanation should be offered to you, because, although, when Mr. Twells has been absent on two previous occasions, I have been ready to take his place, it must have appeared strange to many of you to see him sitting on my right hand, and me filling the chair at this meeting. I am quite sure that all the proprietors will agree with the directors, who feel strongly that Mr. Twells, during the time he has occupied the chair since Mr. Attwood resigned it, has done his duty well, and has been of essential service to the Imperial Continental Gas Association. The other circumstance to which I wish to allude is one of a different character altogether. I have been looking back at the reports of the association for several years past, and I see that it has been mentioned, both by Mr. Twells and myself, on more than one occasion, that we were anxious, when the time came, to write up the uncalled capital on the 56,000 shares. At the last meeting Mr. Twells stated to the shareholders that it was our intention to take counsel's opinion, and to see in what way, if in any way, we could accomplish this result, which was desired by the board and the shareholders in common. We have taken counsel's opinion, which is not so clear and satisfactory upon the matter as we should have desired. To obtain this opinion we have had to go through a considerable amount of delay, because, as you are aware, our last meeting was held in June, and a case had to be prepared and stated for their consideration, and it takes a long time to get the opinion of eminent counsel, especially at a period not more than six weeks before the long vacation. In fact, we did not get it until a short time ago, and there were then so many points raised by it, which we must consider and discuss with our solicitors before we are able to come to a decision, that at present we are not in a position to give you any further information in the matter. The shareholders will, I am sure, agree with the directors, that whatever we do we had better do as the result of a deliberate opinion, carefully formed after the most mature reflection. Such being the case, I can only state that we do not, as a board, consider we are yet in a position to advise the shareholders as to the plan which ought to be adopted on the subject, which must, therefore, under the circumstances, remain for future determination. And now a few words with regard to the report. You will find, I think, that, on the whole, our work, during the half year, has been most satisfactory; in fact, I believe more satisfactory than in any previous half year, except the last, that can be found in the history of the association. And when we look at the steady progress which this association has made (I believe partly owing to the wise policy adopted in the past of following the rules of caution in the management of the undertaking), we have afforded to us a pleasing contrast to what occurs with regard to so many other investments at the present day, and of which we have at the present moment a signal example in the crowd of anxious Egyptians in the hall below. Gentlemen, the state of this association depends very greatly, as declared to you on many occasions, on the price of coals. During the discussions which we have had in renewing contracts at many of our stations, we have been told, in more than one instance, by persons connected with corporations and municipal bodies, that really the price of coal very little affected a gas company; and when we have heard this statement, we have never failed to express our entire dissent from it. And when I point out that, in the course of our business, we use not 10,000 or 20,000, but between 200,000 and 300,000 tons of coal every year, you can well understand that a diminution in price of half-a-crown a ton on the quantity we have to purchase must have a very material effect on the prosperity of our undertaking. Now, fortunately for us, at the present moment, although trade has been at a standstill, and though we have not got the normal increase of consumption which we might have had if trade had been more prosperous, we can still give you a very favourable report, owing to the extremely low price of coal, which I have mentioned to you. There is one thing, also, noticed in this report, and which is to the board, I assure you, highly satisfactory—and to none more so than to myself—viz., that we are, on the whole, on excellent terms with every town which we light. I am sorry to say that not on one occasion only, but on many occasions, we have had to meet the proprietors and to tell them of discussions, and I might even say of dissensions and difficulties, which have clouded the horizon of this association, and made us more than anxious with regard to our future progress. But at the present moment, owing to the labours—and they have not been light—which the board have had to go through during the last five years in settling the great questions which arose at some of our most important stations, in settling the difficulties which encountered us at every step, in the arrangement of the new contract at Vienna, in vindicating our right to our property if not to the future lighting of Bordeaux, and in seeing we did not lose what belonged to us at Brussels, and which kept us continually on the *qui vive*—all these questions being now set at rest, the board are not kept in that constant state of excitement and condition of expectancy which for the last five years have daily disturbed them. This, I think, is a matter for congratulation. At the same time we must bear in mind—and it is desirable you should clearly appreciate the fact—that this association is not in the position of many English gas companies, who have, as we know, a freehold property in their undertakings, and are not dependent upon any municipal concession or contract with a local authority. They have obtained Acts of Parliament which entitle them to light particular districts, and, subject to the parliamentary rule, they are able to go on from year to year without any anxiety as to what their position hereafter may be. But there are very few towns on the Continent which we light, where any such privilege is given. In fact, the contrary is the practice. We can only obtain contracts for a limited number of years, and at the expiration of those contracts we can only obtain renewals at considerable sacrifice. That is the reason why this association has been always obliged to take care to have large reserves in order that there may be something to fall back upon if we do unfortunately lose a town. Every one knows how we lost years ago, before I was a director, the town of Marseilles. In the same way also we subsequently lost the town of Toulouse. These two losses—together with the fact that although, owing to the exertions of Mr. Drory and the board, we have not lost the value of our property at Bordeaux, still we have lost the lighting of the town, and may be placed in the same position elsewhere—demand from us a certain amount of caution in dealing with the funds of the association. The board have been always anxious to distribute in dividend to the shareholders as much as they felt they could safely do, and on the last occasion Mr. Twells stated that the 15s. per share then divided as bonus, in addition to the ordinary dividend, would replace the 5s. per share which had been necessarily deducted in three previous half years in consequence of the high price of coal. He also stated that the directors hoped to be able to maintain the £2 per share dividend paid at that time, and I am happy to state that on this occasion we are not only able to do so, but to increase it by a bonus of 10s. We have thus appropriated somewhat more to dividend this half year than we did in the past, when we compare the receipts of the two periods; but we think we have been justified in doing so because we do not at present see that any disturbance is likely to arise to affect our position, and because we have at our disposal, for capital purposes, the money we received for the works at Bordeaux, and a portion of the amount we are to receive for what we have sold to the town of Brussels. Under these circumstances I think it ought to be satisfactory to the shareholders to receive the report we have ventured to lay before them, and also to receive what I cannot help thinking is a very satisfactory dividend. And now I want to say a word from the point of view of the shareholders instead of that of the directors. I find, upon looking at the list of shareholders, that we have had an increase of something like 100 during the last half year. The total number of shareholders is now about 2100. But you will perhaps be surprised when you learn the fact that of the 56,000 shares into which the capital of the association is divided, over 12,000 shares are held by members of the board and their families, so that if the directors on any occasion err on the side of prudence in the distribution of profits, there are none, *qua* shareholders, more affected by the circumstance than the directors themselves and their families, holding as they do, amongst them, between one-fifth and one-fourth of the entire capital of the association. There is another point, also, of some interest, and that is this: I find that, some years ago, when the association was more struggling than it can be said to be now, the directors and the shareholders thought fit to divide, on most occasions, not more than about half of the profits for the time being; indeed, they were obliged to adopt the plan of using every penny available for the purpose of carrying out extensions. I have been looking through the reports of many half years, and I find that on one occasion it was even thought advisable only to divide two-fifths of the profits of the year. We are now able safely to divide three-fourths, and I think that is a very satisfactory position; for it shows that the policy of the board, approved from time to time by the shareholders, is now bearing fruit in the great prosperity of the association now, at a time when so many enterprises have failed. There is one other subject which, perhaps, it is as well to mention, because notice was given at the last meeting by a shareholder, that he would move a resolution upon it to-day—I refer to the question of the remuneration of the board, which Mr. Price has intimated his intention to propose shall be increased from £3000 to £5000 per annum. I believe, as stated in the report, that this proposal is generally approved by the shareholders. In the year 1870, when we had had very considerable labour and difficulty in obtaining an Act of Parliament for re-arranging our capital, it was moved by a shareholder, now a director, to increase the remuneration of the board for that year by the sum of £2000. The board, however, told the meeting of shareholders that they preferred not to receive that additional sum. I think, therefore, if they are now willing to receive the amount by which it is proposed to increase their remuneration, they have shown, at all events, by their past conduct, that they are not anxious for a higher recompense than they are entitled to for a great deal of hard work. And, without any concealment, I would say that but for the large personal interest I have in the association, and the large

interest my family have had in it from the first, I should never have undertaken the duties of a director; for, to my surprise, when I came on the board I found the labours and responsibilities much greater than I had anticipated, and I do not think the remuneration is at all in correspondence with it. Under these circumstances, although one individual may be easily replaced, I think the shareholders will see that the board, in saying they are willing to accept what it is proposed to give them by way of increase of remuneration, are not accepting more than is due to them for their services. Gentlemen, I have thought it right to mention this in common with the other points referred to, and with regard to which notice has been given for the present meeting. There are many subjects of interest raised in the present report, and if the shareholders desire information upon any that I may not have touched, I shall be quite ready, so far as is consistent with the interests of the association, to give all the information in my power. It now only remains for me to move the adoption of the report which has been read.

A SHAREHOLDER seconded the motion.

The CHAIRMAN, in answer to an inquiry, said it had been explained to the meetings on more than one occasion that during the time of the coal famine the association was practically working the station at Frankfort-on-the-Maine without any profit. There was another company there in precisely the same condition. The two combined at one time to ask the authorities to allow them to raise the price of gas, as they had power to do, on being satisfied that the companies were not getting a reasonable profit. Permission, however, was refused. The price at which the association took the lighting of Frankfort was exceedingly low, the desire being to keep out a third company. The directors were doing all they could to make that station more profitable than it had been up to the present time, and nothing would be wanting on their part, or on the part of Mr. W. Drory, who had it in charge, to make it successful.

Mr. PRICE said he spoke under feelings of some disappointment. He thought, after looking at the accounts, that the least the shareholders might have anticipated on the present occasion, in the way of dividend or bonus, was £2 15s. or £3 per share. It would not be difficult to show that the profits would easily pay this and leave a considerable reserve. He had been expecting that when the directors came before the shareholders again it would be not only with an increased dividend, but also with a proposal to write up the amount due upon the shares. The chairman had, however, told the meeting that there were difficulties in the way. Of course when lawyers had to be consulted there would be, for lawyers always raised difficulties, but never solved them. For his own part he thought, in a trading concern like this, when the directors had paid off nearly the whole of the bonds—the very liability against which calls were to be made answerable—there need not have been any difficulty in getting over the scruples that had been suggested on this point. He found, on comparing the last half year with the corresponding half of 1875, that there had been a marked increase in the profits of the association, which was the reason why he expected a larger dividend. No doubt, from the fact stated by the chairman, that the association did not possess freehold rights as English companies did, a proper reserve should be maintained; but making all due allowance for that, he considered greater liberality should be shown to the present shareholders. In addition to the large sums the directors had as investments, he found that they had also a reserve-fund account, to which a large amount had been credited. Under these circumstances, he was of opinion they should, if possible, amend their scheme, and give the shareholders £2 15s. per share on the present occasion. He objected to the term "bonus," in addition to dividend. It was all dividend, being the profit earnings from the sale of gas; and to call any portion of it a bonus was a misnomer. He wished it to be clearly understood that he would not rest until a larger dividend than £2 10s. per share was declared; and, as the shareholders were about to increase the remuneration of the directors, he would suggest to the board whether they might not gracefully concede a little to the general body of proprietors, and give them a little larger share of their own well-earned profits. If he could find a seconder, he would move an amendment to the scheme of the directors.

The CHAIRMAN said it could not be done under the provisions of the Act of Parliament.

Mr. PRICE was sorry to hear it. But he would take another point. It was positively depreciating the value of the shares for the directors to exercise too much caution in respect to the rate of dividend.

The CHAIRMAN: Perhaps you will allow me to say a few words to explain to Mr. Price and others, some matters which seem to be lost sight of, and which are exceedingly simple when put before you, as I shall put them. With a great many of Mr. Price's general propositions I entirely concur. The only question is, whether they apply to the present case, but I think it is not fair to detain you by going into this matter at length. With regard to the amount of the investments, you will understand that we received, in the months of April and May last, just before the accounts were closed for the half year, the purchase-money for the Bordeaux works, and for the stock of coals, amounting to nearly £182,000. We being entirely of opinion that the amount the brokers offered for the use of it was exceedingly unsatisfactory, did what I am sure every business man would do under the circumstances—we invested it, not in Peruvians or Egyptians, but in securities which we knew were sound and good. That money, which was capital money, could not, as you are aware, be diverted for dividend purposes. This explains the reason very clearly, I think, why, we have such large investments as the honourable proprietor has mentioned. Mr. Price, moreover, does not know, probably, that our remittances come principally in the winter months, the consequence of which is that at this time of year, when we are paying for coals that we have purchased, we must necessarily have money ready, and in our possession, for the purpose. We have also to accumulate many thousands of pounds to be prepared for the payment of dividends. At the present moment we have not the cash for your dividends, though we are a solvent company; we must use some of those securities which we bought for the time, because they offered a better interest than we could get from the brokers. There is also another point which is exceedingly simple. This association has for very many years never put by a separate reserve-fund, and my honourable colleague (Mr. Bassett), to whom reference has been made, when he sat on the other side of the table, said that, in his opinion, for a company like this no reserve-fund could scarcely be too large, and that he would like to see it placed in a safe investment, over which the board could have no control. Now you see that the directors have placed a sum of money to a separate reserve-fund, adopting the principle which had the approval of the shareholders. With regard to the Act of Parliament, I do not know whether Mr. Price was a shareholder at the time, but I do know that a great deal of trouble was taken by the board to carry out the views he has expressed on the subject. Mr. Twells, Mr. Newton, and myself, with other legal members of the board, worked very hard at the time in order to do so. There is a further point which the honourable proprietor seems to have forgotten, and that is that we are paying now at least as good a dividend as we paid during the latter half of last year, and a better dividend than during the corresponding six months—not larger in actual amount, but larger in proportion to the total profits. And it must be borne in mind, too, that the half year ending June 30 is the worse half of the year for us. Then I would say that we are not like a company whose shares are quoted at a tremendously high premium one day, and a few months after are quoted at a much lower price. We have desired, and by the policy we have pursued we have endeavoured to ensure, that the association shall be known as being the most solid of gas companies on the continent of Europe, and I can only venture to prophecy that whenever we can recommend an increased dividend which we see our way to maintain, we shall only be too glad to do it.

The motion for the adoption of the report was put and carried unanimously.

The CHAIRMAN moved—"That a dividend of £2 per share, and a bonus of 10s. per share, on the 56,000 shares of the association, be declared for the half year ending the 30th of June last, and that the same be payable, free of income-tax, on and after the 15th of December next, as recommended in the report."

The motion having been seconded, was put and carried *nem. con.*

Mr. PRICE, in accordance with notice, then moved a formal resolution to the effect that the sum placed at the disposal of the board for the remuneration of the directors be increased by the sum of £2000.

The motion was seconded and carried unanimously.

The CHAIRMAN: I have to thank the proprietors for this expression of their approval and confidence. I am sure that the more Mr. Price sees of the association, the more he will be convinced that it is managed, on the whole, with great prudence.

Mr. PRICE: I have been a shareholder for 20 years.

The CHAIRMAN: I wish, on the present occasion, to point out that if we, as a board, have done our best to accomplish results which, upon the whole, are satisfactory, we have been able to accomplish them mainly through the valuable services rendered to us by our very efficient staff, and especially Mr. Drory, who has been connected with the association from its commencement—51 years ago. The association has had excellent chairmen, some of whom have devoted a vast amount of time and labour to the duties devolving upon them, but after a few years they have found they had had enough of it, and have retired. Mr. Drory, however, has still remained at his post, and we are exceedingly indebted to him, and the agents under him, for the valuable services they have rendered us. I desire—to-day more especially—to bear this testimony, because I am sorry to say that Mr. George Drory, the son of Mr. Drory, and the chief engineer of the association at Brussels, has been compelled to retire from active duty through ill health, a circumstance we very much regret, remembering the efficient manner in which his services have been rendered. I therefore move that the hearty thanks of the company, and of this meeting assembled, be presented to Mr. Drory and the officers under him at the several stations of the association.

The vote was heartily responded to, and thanks having been presented to the chairman, the proceedings closed.

ORIENTAL GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders was held at the Offices of the Company, 29, Great St. Helen's, London, on Thursday, Nov. 30—JAMES SYDNEY STOPFORD, Esq., in the chair.

The SECRETARY (Mr. A. Hersee) having read the notice convening the meeting, the following report and statement of accounts were presented:—

The directors have the pleasure to submit a statement of accounts for the twelve months ended on the 30th of June last. The results of the company's operations during the above period show an increased profit, notwithstanding the stagnation of trade, and other adverse influences which have prevailed.

There has been an addition of 102 public lamps, half of which were erected at Calcutta and half at Howrah. Orders have been received from the Port Commissioners for the erection of 37 more lamps on the river bank, and further orders are anticipated. The yield of the rate for public lighting in Calcutta being now in excess of the expenditure, an application has been made to the corporation to increase the number of street lamps.

The revenue arising from gas used for private lighting has been prejudicially affected, partly through the economy induced by the dulness of trade, but chiefly through the effect of a reduction in the price of gas, which came into operation on the 1st of March last. This step was undertaken, after due consideration, upon the recommendation of the committee in Calcutta, and is expected, eventually, to create an extended consumption of gas. During the twelve months, 65 new private consumers and 1514 additional burners were obtained. The bazaar lights show a trifling decrease in number.

The progress at Howrah is encouraging, but the heavy scale of tolls charged in connexion with the floating bridge across the Hooghly operates seriously against the expected development of that district in importance.

The whole of the works and machinery of the company are reported to be in a state of efficiency. The cast-iron tank and framing for the new gasholder has reached Calcutta, and the excavations and other necessary works are being actively proceeded with.

The replacement of pipes damaged by the sanitary works of the corporation has been continued throughout the year, and the renewal of the smaller-sized mains is now, practically, completed. It has, unfortunately, been found requisite to relay a considerable quantity of mains which were disturbed by the sinking of the soil after completion of the drainage works. The loss of gas by leakage in 1875-6 shows a diminution, as compared with the previous twelve months, and earnest efforts are still being made to further reduce the loss. The length of new mains laid during the year was 3 miles 1109 yards.

The shareholders cannot fail to have noticed the serious alteration in the rates of Indian exchanges, occasioned chiefly by the recent rapid depreciation in the value of silver. The adverse fluctuations have been so wide and perplexing that the additional loss to the company in the present year must have an unfavourable effect upon the profits. The existing rates, though better than they have been, are still such as to occasion continued anxiety.

The directors are happy to report that the illuminations at Calcutta in December last, in honour of the visit of H.R.H. the Prince of Wales, were completely successful. Great credit is due to Mr. Blackburn and his assistants for the admirable manner in which the arrangements were carried out, and the shareholders will be gratified to learn that the extraordinary efforts made by the company to ensure success were officially acknowledged by the authorities at Calcutta.

Advantage has been taken of the present depression to effect a favourable contract for a full supply of coal for a period of three years. It should be pointed out that the price of coke is prejudiced by the lower cost of coal.

The members of the resident committee—Messrs. E. Broughton, R. C. Noble, and H. W. J. Wood—have continued to show the same warm interest in promoting the progress of the company; and the able services of the engineer and manager—Mr. Blackburn—are also highly appreciated by the directors.

The general revenue account shows a balance (after crediting £1145 13s. to the reserve-fund) of £14,611 11s., which would admit of a similar dividend to that of last year; but, bearing in mind the effect of exchange upon the profits of the current financial year, the directors recommend a distribution of 5 per cent., free of income-tax, payable on the 4th prox., making, with the interim dividend of 4 per cent. on the 3rd of June last, a total of 9 per cent. for the year.

Two of the directors—John Robinson Peill and James Sydney Stopford, Esqs.—retire from office on this occasion, and offer themselves for re-election. The auditors—Henry Lawrence Hammack and Thomas Newton Stokes, Esqs.—also retire, and offer themselves for re-election.

Balance-Sheet, June 30, 1876.

Dr.			*Cr.*		
30,000 shares of £5 each	£150,000	0 0	Amount of plant on the 30th of June, 1875	£273,181	13 0
29,992 " " (60s. paid)	89,976	0 0	Outlay during the past 12 months	9,617	11 10
8 " " (50s. paid)	20	0 0			
	£239,996	0 0			
Loans on debentures	74,320	0 0	Cost of plant to the 30th of June, 1876	£282,799	4 10
Unclaimed dividends	520	1 1	Services laid and meters in use	7,013	15 10
Reserve-fund	10,000	0 0	Amount due to the company	5,800	15 3
Amount due by the company	2,364	18 1	Value of stocks, viz.—		
Balance from general revenue account	14,611	11 0	Coals	3,962	5 10
			Purifying material	770	9 10
			Products	1,649	1 1
			Fittings and meters	6,088	1 5
			Pipes	3,422	4 9
			Horses, conveyances, &c.	400	10 0
			Sundry stores	6,606	1 11
			Office furniture, &c.	423	10 9
			Cash in Calcutta	18,152	3 10
			Cash in London	2,724	4 10
			Bank bills in hand	2,000	0 0
	£341,812	10 2		£341,812	10 2

Profit and Loss, or Working Account, for the Twelve Months ending June 30, 1876.

Manufacture & distribution— Coals used, purification, and wages	£19,993	12	0	Gas-rental	£49,160	18	4
Salaries in India & London	2,898	14	0	Coke, tar, fittings, &c.	13,428	18	1
Directors and auditors	913	0	0	Transfer fees	12	19	6
Passage & general expenses	929	15	10				
Exchange	2,314	1	10				
Reserve-fund	1,145	13	0				
Mains account	4,424	7	5				
Wear and tear and repairs	2,308	8	3				
Retort account	856	18	3				
Bad debts and allowances	234	13	8				
	£36,016	4	3				
Balance	26,586	11	8				
	£62,602	15	11		£62,602	15	11

General Revenue Account, June 30, 1876.

Dividend of 5½ per cent. balance of 9½ per cent., for the 12 months ending the 30th of June, 1875, declared at the general meeting, November, 1875	£12,375	0	0	Balance on the 30th of June, 1875	£13,672	11	1
Interim dividend of 4 per cent., on account of year ending the 30th of June, 1876, paid June 3	9,300	0	0	Ditto on profit and loss account	26,586	11	8
Interest on debentures	3,766	13	11				
Income-tax	205	17	10				
	£25,647	11	9				
Balance	14,611	11	0				
	£40,259	2	9		£40,259	2	9

The CHAIRMAN, in moving the adoption of the report, said he had again to express regret at the absence, through ill-health, of the chairman of the board (Mr. Fawcett). The report just submitted was a very full digest of the most important and interesting subjects connected with, or arising out of, the operations of the company during the past year, and therefore it would not be necessary for him to make many remarks on the present occasion. It was satisfactory to find that, notwithstanding the pressures of bad times, the profits of the company exceeded by £1000 those of the previous year. It was true, however, that it was proposed to divide half per cent. less dividend than before; but this had been necessitated by circumstances over which the directors had no control—viz., the depressed state of trade, and the unfavourable rates of exchange. Still, considering all things, he did not think 9 per cent. a very unsatisfactory dividend, remembering that, in addition to paying that rate, they were able to carry over £2600 to the current year's account. With reference to the public lighting in Calcutta, it was pleasing to see that it had made steady progress. In addition to the increase mentioned in the report, he might state that as the Port Commissioners, are extending the jetties up to Chitpore, a distance of three miles, the company were expecting from them further orders for lighting, and they were sending out lamp-posts with that expectation. Additional street-lamps were also looked for, as the lighting-rate, instead of being, as in past times, a deficit, showed a surplus, after paying for existing lamps, and the corporation were bound to apply that for extensions of lighting. In the private consumption there had been a falling off, owing to the bad state of trade and the cheapness with which oil, in comparison with gas, could be supplied. The directors, on the repeated representations of the Local Committee and their manager, reduced the price of gas from six rupees to five, in March last, and this step, voluntary on their part, had given great satisfaction; but the results as yet had not equalled their expectations. The effects of the reduction up to the end of June was a loss in rental of about £800; still he believed the directors took the right course in making it, and that eventually it would lead to an increase in the consumption. Indeed, since August there had been a favourable change; the applications by new customers had been more numerous, and the latest advices from Calcutta were of a cheering character. The bazaar lights had somewhat decreased, and the company had not encouraged them, owing to the difficulty of getting honest customers; but in this respect there was an improvement. At Howrah there had been an increase in the street lighting; but the expected increase in private lighting rental there, from the opening of the bridge across the Hoogly, had not been realized, on account of the heavy tolls exacted by the Municipality. The erection of the new gasholder had been delayed by the rainy season, but the work was now being proceeded with. The company were still suffering from injuries done to their pipes by the sewerage works; nevertheless the leakage had been reduced in the last year from 32 to 26 per cent., and it was hoped that it might, hereafter, be brought down to 20 per cent. The low rate of exchange and the depreciation in the value of silver had had a very serious effect upon the profits of the company; but there were signs of some improvement in this direction. The company having remittances to the amount of £30,000 a year from Calcutta, it was a matter of no slight importance whether they could obtain it at 5 or 20 per cent. loss. It was because of the uncertainty prevailing in reference to this question that the directors had been induced to recommend a lower dividend on the present occasion. The illuminations in honour of the Prince of Wales's visit were highly successful, and gave great satisfaction to the authorities, who complimented Mr. Blackburn upon the ability displayed by him and his assistants in the matter. The report referred to the coal contracts which had been entered into, and which were very favourable to the company. In fact, apart from the question of exchange, their position was very encouraging. They had cheap coal secured for some years, an increasing demand for gas, and a decreasing leakage, and he might also mention that there would be a saving in the item of "Interest on debentures," inasmuch as a large amount of debentures fell due this year, which had been renewed at a lower rate. The committee in Calcutta, and the engineer and manager, continued to show much energy in their desire to serve the company, and they kept the directors fully informed on every point. With these remarks he moved the adoption of the report.

Mr. WHITE seconded the motion.

The CHAIRMAN, in reply to a shareholder, stated that the company maintained an action-at-law with the corporation for damage done to their pipes through the sewerage works, and they were successful on two occasions; but, considering the relations existing between them, it had been thought undesirable to press for compensation, and the company retired from the suit, the corporation paying all the costs of the action.

Mr. LOVEJOY suggested that the reserve-fund of £10,000 should be invested in some securities which would yield interest.

The CHAIRMAN said the money was not lying idle, but was employed by the directors as working capital.

Mr. BACKLER remarked that if the £10,000 had been invested, as Mr. Lovejoy thought it should have been—in Consols, for instance—it would have paid only 3 per cent., whereas it had been earning 9 per cent. by being worked in the undertaking.

The motion was put and carried.

On the motion of Mr. WHITE, seconded by Mr. HAMMACK, the retiring directors were re-elected, and each returned thanks.

Mr. CARTER moved, and Mr. HILL seconded, the re-election of the retiring auditors, which was agreed to.

Mr. BACKLER said it was his pleasing duty to move the declaration of the dividend recommended in the report. The directors, of course, regretted that they were not able to pay a higher rate, but he thought the shareholders would agree with them that under existing circumstances it would have been unwise to pay more. As prudent men, he felt that it was far better to provide for the future than to pay a large amount now, and perhaps next year have to reduce the rate of dividend. As the accounts stood, they might, by trenching a little upon the reserve-fund, have paid 10 per cent.; but, in paying only nine, they took what they were persuaded was the correct course, and he hoped their recommendation would be endorsed by the meeting. The question of exchange was that which would necessarily influence the dividend this year, and that, of course, the directors had no means of regulating, except in being careful in choosing the means of remittance, and that they would do to the utmost of their ability. With regard to the reduction in the price of gas, which had been rather a loss to the company in the past year, his own impression was that it would be recuperative, and that in the coming year it would assist the dividend.

Mr. PEILL seconded the motion, which was put and carried.

Mr. HAMMACK moved a vote of thanks to the directors, which was carried unanimously.

The CHAIRMAN, in acknowledging the vote, referred to the great services rendered to the company by the committee in Calcutta, and by Mr. Blackburn, and he moved a vote of thanks to them and to the secretary.

Mr. STOKES seconded the motion, which was carried unanimously.

Mr. HERSEE, having acknowledged the vote for himself and colleagues in Calcutta, the proceedings terminated.

HORNCASTLE GAS ARBITRATION.

THURSDAY, SEPT. 28.

(*Before Mr.* ALFRED PENNY, C.E., *Umpire; and Messrs.* R. P. SPICE, C.E., *and* G. W. STEVENSON, C.E., *Arbitrators.*)

(*Continued from page* 775.)

A detailed statement of the receipts and expenditure, and liabilities of the Horncastle Gas Company for the year 1875 was handed in, as was also a statement of profits shown by the company in account delivered to the board on July 26, 1876, and of the deductions therefrom claimed by the board, the latter being as follows:—

Balance of profit, as per account furnished by the Horncastle Gas Company					£1,341	2 3
Further deductions proper to be made—						
Expenditure on maintenance of buildings, machinery, and retorts, mains, services, meters, &c., viz.—						
Cost of renewing five burnt-out retorts, at £8 each, seven retorts only renewed instead of ten	£40	0	0			
Cost of renewing the following meters (nothing allowed)—						
Three 3-light meters, at £1 10s. 6d.	£4	11	6			
One 5-light meter, at £1 17s.	1	17	0			
Two 5-light meters, at £1 17s.	3	14	0			
One 10-light meter, at £2 8s.	2	8	0			
	12	10	6			
Cost of renewing one 14-inch lamp (nothing allowed)	0	17	9			
Cost of renewing 120 yards of 1½-inch mains, 1s. 6d., and 10d. for laying (nothing allowed)	14	0	0			
Manager, £150 per annum, less £104 allowed	46	0	0			
Secretary, clerk, book-keeper, &c., £50 per annum, less £25 allowed	25	0	0			
Collector, 1½ per cent. on private gas-rental, £2061 5s. 3d., £30 18s. 1d., less £25 allowed	5	18	1			
Bad debts, 1 per cent. on private rental, £2061 5s. 3d. (nothing allowed)	20	12	2			
Interest on floating capital, £700, at 5 per cent., £35, less £16 5s. 1d. allowed	18	14	11			
Insurance of buildings on works, £1000, at 10s. 6d. per cent., and £3000 at 2s. 6d. per cent. (nothing allowed)	9	0	0			
Depreciation of meters, 7½ per cent. on £800, the estimated value of meters (life of meter at 15 years)	60	0	0			
Depreciation, 1 per cent. on Mr. Stevenson's structural value, *plus* the meters, £12,234	122	6	9			
Cost of coal carbonized, £1166 tons, at 23s. 3d.	£1355	9	6			
Less allowed	996	16	7			
	358	12	11			
					733	13 1
Net annual profit					£607	9 2
£607 9s. 2d. capitalized at 16¾ years purchase—say					£10,124	6 1
Deduct—						
Cost of renewing seven retorts, at £8 each. These retorts were renewed in 1875, but in consequence of the bad workmanship, it became necessary to renew the same in 1876	£56	0	0			
Cost of putting governor and scrubber in order, and renewal of original gasholder	300	0	0			
					356	0 0
Value of works and undertaking					£9,768	6 1

Mr. *A. Lass* recalled, and further cross-examined by Mr. TAYLOR.

I have not disturbed the account which was furnished by the Horncastle Gas Company.

Mr. TAYLOR: Did you arrive at any conclusion as to what the profits of the undertaking were without making the deductions which you claimed yesterday?

Witness: I endeavoured to test the correctness of the account as far as I possibly could, and I satisfied myself that the account as furnished, upon the whole, was about correct, and I have taken it as such.

Re-examined by Mr. SOMERSET: I understood from Mr. Taylor's question that he wished to know whether I disturbed in any way the amount of profit as shown upon the account furnished by the gas company to the Horncastle Local Board, and I said, as far as that account was concerned, I trusted it as well as I could, and I see no reason to disturb the amount as shown in that account—£1341 2s. 3d.; but the whole of my subsequent calculations are based upon that foundation. I took Mr. Boulton's and Mr. Dixon's statements, and I think the whole of the invoices, so far as the coal account is concerned, and I took for the basis of my account the check-book itself, and made my own cash accounts from it. I also took the gas-rental book.

By Mr. STEVENSON: I believe all the books the company possessed were placed before me; also the vouchers, bank-book, pass-book, and the counterfoils of their checks. Any book I wished for I asked for, and when they told me they had no book to furnish me with, I immediately considered the company kept no book, and I made my examination in the best way I could afterwards. I saw no reason to disturb the profit of £1341 2s. 3d. as the basis upon which to make further calculations.

By Mr. SPICE: I also saw a book in which was entered an account of the residuals sold on credit, from which I made an extract. I did not consider the £1341 2s. 3d. to be profit.

By Mr. STEVENSON: I should not like to call that amount profit at all. It can hardly be called a revenue account in the absence of the stocks, although the stocks may be the same at the commencement of the year as at the end; but there being no stocks at the end of the year you cannot call it revenue. It is the balance of an account.

The UMPIRE: After all these calculations and manipulations of that statement of account, do you wish the arbitrators to consider that the figures you have arrived at are the proper figures upon which to form a valuation of this concern?

Witness: I do, subject to the question as to the cost of the coal. We seek to claim £358 12s. 11d. There is a difference between 1166 tons of coal at 23s. 3d., and 1165 tons at 17s. 1d.; and there is a question whether that should not be 1015 tons at 23s. 3d., to make it consistent with the evidence given before the parliamentary committee. That question is reserved, I believe.

Mr. *S. Hunter*, examined by Mr. SOMERSET.

I am a civil engineer, and am also the engineer and manager of the Salford Corporation Gas-Works. I advised the Horncastle Local Board during the time the case was before Parliament, but I was not called as a witness. I heard the evidence given by Messrs Boulton, Dixon, and Stevenson. I have only been to Horncastle once since the passing of the bill, and that was in company with Mr. Lass, upon which occasion we went through all these matters with Mr. Boulton and Mr. Dixon, and were shown certain books, invoices, and so forth. I consider the claim made by the gas company far too high, I think the item "Cost of renewing five retorts," ought to be put in to reduce their claim, because less than the usual number were renewed in 1875. There are 24 retorts in the whole house, and it is usual to renew 12 of them annually; but only seven of them were renewed last year, and consequently I charge for the extra five at £8 per retort, making £40. I found a given number of the meters were used for renewals which were charged in the company's account to capital, but I take them from that account, and charge them to revenue. In my calculation I have taken the life of a meter at 15 years, and have put each meter at its cost price, and the total is £12 10s. 6d., which is the market price for the day. We found by an invoice which was presented to us that five lamps were purchased; four of them were placed in stock, and the other was used for the ordinary working of the concern during the year 1875, to renew another lamp, and consequently we charge it to the revenue account of the year. In addition to that I understand there is a torch which was disposed of to the local board; that is 12s., which should also be added to the 17s. 9d. My attention was drawn to the 120 yards of 1½-inch main by seeing some invoices from the firm of Newton, Chambers, and Co. I inquired as to what purpose the pipes were used for, and I found that they were used for the replacing of an old main—3-inch were put down and 1½-inch taken up, so I charge the difference to the revenue of the year. With regard to the manager, Mr. Dixon could not be replaced with a man of equal ability for less than £150 a year. Respecting the secretary, clerk, and bookkeeper, I ascertained there were two whom I should term managing partners, in addition to the manager, Mr. Dixon—viz., Mr. Boulton and Mr. Wright; and as these gentlemen worked as much for the dividend they were paid as for the nominal sum they received directly, I concluded that in the future management we ought to calculate that those gentlemen will have to be replaced, or that Mr. Dixon would have to do the extra work. You could not obtain a gentleman to act as secretary for less than £50 a year, and therefore I add £25 to the £25 allowed. The collector is Mr. Wright, and he is a shareholder also. In allowing an addition of £5 18s. 1d. for the collector, I have considered the cost of collecting in similar towns, and also the cost of collecting in larger towns. In the latter case it ought to be done cheaper; but I have made the calculation for Horncastle the same as for a larger town, and I have taken 1½ per cent.; it cannot be done for less. The item for insurance I take upon the structural value—10s. 6d. per cent. upon £1000, and 2s. 6d. per cent. upon £3000, making £9. I make the difference because the insurance companies charge a differential rate proportionately with the risk they run. I do not put anything upon the land. At Salford we charge a sum not exceeding 3 per cent., which covers all classes of depreciation. I have taken the actual cost of meters at the present price, and allowed an extra sum upon them of 7½ per cent. I took the numbers and the sizes of the meters from the rental of the company and carried out that value, which I find to be £800, and allowed 7½ per cent. upon that. In similar arbitrations to the present a reserve-fund for depreciation of plant has been allowed, and I put that at 1 per cent., which amounts to £122 6s. 9d. I found through Mr. Lass's examination that bad debts had been made, and it is usual to lay by a reserve to meet such cases, and I have allowed 1 per cent., which comes to £20 12s. 2d. I consider the sum of £700 to be a reasonable sum for interest upon floating capital. I have taken £1500 for the cost of the Act; but with so much opposition I am afraid it will be more than I have down. On those two items I have allowed 5 per cent., making £35. Mr. Stevenson allows 7 per cent. With regard to the difference in the cost of coal, I took Mr. Lass's calculation of 1166 tons 13 cwts. I heard Mr. Dixon and Mr. Boulton give the information as to the stock of coal. I first of all asked what was their stock on Dec. 31, 1874, and was told there was no entry of it. Then I asked what was the stock upon Dec. 31, 1875, and first of all they said there was no record of it; but some time after they turned to a page in the coal-book and showed me an entry of 150 tons, which I had reason to believe was not entered upon the 1st of Jan., 1876, but at some subsequent date. That book is in the possession of Mr. Boulton, I suppose. [The production of the book was asked for.] They stated from memory that the stock was the same at the beginning of the year. I therefore took it that the coal they received in 1875 was what was carbonized in that year, 1166 tons. For the price I adopt Mr. Lass's figure, which is 17s. 1d., making £996 16s. 7d. The 1166 tons, calculated at what was stated by Mr. Boulton and others in the House of Commons, works out at £1355 9s. 6d.; therefore, the difference between the two is £358 12s. 11d., and in my calculation I have added that amount to be deducted, making the entire deduction £1341, and there then remains £607 9s. 2d. From that amount, which multiplied by 16¾ comes to £10,124 6s. 1d., there is further to be deducted the cost of renewing the retorts, which should have been charged to last year's account, and consequently the cost will fall upon the local board this year; and I deduct £56 for that, which in my opinion is correct. There is also the cost of putting the governor and scrubber in order, which was not necessary for the extension of the business, but to properly manufacture the gas, and supply the consumers at the same rate as they were supplied at last year. I deduct that, because last year their purification was defective. I tested the gas on numerous occasions, and found a considerable quantity of ammonia present. I put the expenses in connexion with the scrubber at £70, and the gasholder at £245, making £315, and I allowed 15 per cent. for old metal, making the net £300. That added to the £56 just mentioned makes £356, leaving net £9768 6s. 1d., in exact figures, which I say upon this account is the divisible value in 1875. I have based my calculation principally upon the information given in the House of Commons. First of all, I was influenced by the amount declared as dividend in 1875—viz., £540; but I did not think that was the whole amount. I thought they were doing as other companies did, and that they might have made £600, or possibly £700, though I thought they would hardly go beyond £700, and upon that supposition I advised; but no evidence was given to point to anything further than £540. I made sundry calculations from the different bases given in evidence. From the evidence of Mr. Stevenson I took down the 1015 tons at 23s. 3d., and ran that out at £1179 18s. 9d. Then, if my memory serves me rightly, Mr. Stevenson stated that from an investigation of the accounts he found the manufacturing charges amounted to about 14s. per ton, which works out £710 10s. I have added these two together and make it £1417 15s. 3d. Then I have taken the schedule as put in by Mr. Dixon, and find the residuals, which I deduct, amount to £472 13s. 6d. Having obtained the cost of the coal, I deduct the residuals, and then add the amount of 14s. per ton, and it gives the net cost £1417 15s. 3d. I then take the receipts for gas at £2466 10s. 2d., leaving a balance of £1048 14s. 11d. In preparing these calculations I have not made any further deductions from that amount; but there ought to be the usual depreciation over and above the ordinary working expenses, and also insurance. The deductions should be £9 insurance on buildings; depreciation of meters, £60; and 1 per cent. upon structural value, £122 6s. 9d.; making altogether £191 6s. 9d., and leaving a balance of £857 8s. 2d. Speaking from memory, from the notes I made at the time I estimated the value of the undertaking to be about £12,000 to £14,000; that was, of course, subject to further consideration. I was obliged to take the evidence given in the House of Commons as a basis, not having any other, and under that belief I advised my clients on the subject. I was present outside the room when the discussion took place, which ended in this agreement. It was upon the belief that the evidence given was true that that agreement was arrived at. I had no suspicion it was an inaccurate statement. There was an adjournment for two or three days, during which time I had communications with the local board, and I went upon the same basis, believing it to be true. When I was called in by the local board I was asked a question as to the structural value of the works, and I stated that similar works could be erected for £8000; and I was the more confirmed in that after viewing the works and finding that they were of the cheapest construction, although they are in some sense in substantially good working order.

Cross-examined by Mr. TAYLOR: I was formerly with Mr. Holmes at Huddersfield. I remember the gas-works at Alford, the population of which is 2800, and them of Horncastle 4000. I remember the purchase of the gas-works at Alford by Mr. Holmes. The make of gas at that place would be much less than half that of Horncastle. I do not know whether I ought to name the price paid for those works. A certain price was paid by Mr. Holmes, and that gentleman sold that to a company of which I was an unfortunate shareholder, and the difference between the price which Mr. Holmes paid for, and what he sold them to the company for, was very considerable, and on account of the opposition I took against Mr. Holmes I have already a writ in an action brought against me. I valued the works for Mr. Holmes.

Mr. TAYLOR: What did you value them at?

Mr. SOMERSET objected to the question, and, after considerable discussion,

The UMPIRE said that, as a rule, a gentleman who offered himself for examination was bound to answer any question put to him, but if he said he was in litigation upon that particular matter it was hardly fair to press the question.

Cross-examination resumed: I would not say but that there are exceptional cases, but in the majority of instances the retorts are more likely to be renewed one-half each year. In putting down £46 extra for the manager and £25 for the secretary, I took into consideration the amount of gas they were allowed for nothing, but I do not consider that an equivalent for the services they rendered. There was no necessity to put that item of gas consumed on the other side, because the cost to the company would be something small per 1000.

Mr. SOMERSET: You have stated that insurance was allowed in several Acts; will you tell me one of them?

Witness: I find a debit for insurance in the London Acts which are, perhaps, of the most recent dates. It is not in the special Act under which we are now arbitrating, but from my own experience of companies and corporations with whom I have had to deal, it is customary to pay this insurance before declaring a surplus profit.

Mr. TAYLOR: With regard to the cost of coal do you mean to tell the arbitrators, knowing the price paid by the Horncastle Gas Company was 17s. 1d., you based your calculations upon the wrong figure of 23s. 3d.?

Witness: I stated that the whole of my evidence bearing upon that account was derived from the evidence given in the House of Commons, and, therefore, it was not an erroneous figure.

Mr. SOMERSET: It is perfectly clear one of the accounts must be distinctly untrue.

Cross-examination resumed: I do not say I am warranted in believing that the 23s. 3d. is wrong, only one has as much right to believe that the 23s. 3d. is right as the 17s. 1d. I understand the difference between "dividend" and "divisible;" and if I based a calculation upon a dividend which I supposed to be divisible, it was because the other part was concealed from me. I have some information as to how this business has been carried on, and I do not know of any possible restriction upon a private partnership from dividing all and every halfpenny of the profits. If you chose to carry all the profits over, and say there were none, you could do so. When the schedule was presented by Mr. Bolton, the impression upon my mind, and those who acted with me, was that that represented the year's profits.

Mr. TAYLOR: I want to know whether it is not the fact that the basis of the arbitration is the profits which are divisible, and not the profits which, from anybody else's point of view, might be divisible.

Witness: I say they are not divisible profits if you have not kept up your works, and the whole of the apparatus in efficient working order, leaving them as well upon the 31st of December as you found them upon the 1st of January; whatever depreciation there may have taken place during those 12 months working, it is only right you should charge the difference against the profits of that year. My definition of the term "divisible profits" is the surplus remaining that may be divided as dividend. With regard to depreciation, I certainly think 1 per cent. is the minimum which ought to be allowed. I think I could refer to a similar arbitration to this with regard to the Peterborough Gas-Works, where more than 1 per cent. was allowed.

Mr. TAYLOR: You stated that works similar to those at Horncastle could be constructed for £8000; how is it that you have taken depreciation upon £14,000?

Witness: One is commercial, and the other is structural value, and I have taken the former.

Re-examined by Mr. SOMERSET: Mr. Boulton must either have made a misstatement in the account he sent in of the price of coal, or in his evidence before the House of Commons. Both may be untrue; but both cannot be true. The evidence given by me has been founded upon my own experience in the management of engineering works, and not upon questions of law.

By Mr. SPICE: The effect of leaving out the 12s. for the torch is that the local board have to pay £10 for it—that is to say, 16 times 12s.

The UMPIRE: Do you wish the arbitrators to understand that you did not consider the profit to be divisible till a sum had been paid for insuring the premises.

Witness: Yes. I thought I stated that in the accounts I have to deal with we never declare the divisible profits until we have paid all those charges.

Mr. *Charles Dee*, examined by Mr. SOMERSET.

I am a solicitor and clerk to the local board, and have been their adviser during these contests and up to the present time. The basis of the agreement arrived at was the evidence that had been given in support of the bill and the tables that had been put in by the promoters. Had I any suspicions that those statements were erroneous I should most strongly have advised the board not to have entered into the arrangement at all, and I believe they would not have done so; because it would have entirely defeated the object they had in view. I believe the word "divisible" was put in so that if there was anything further than the dividend it should be multiplied by 16¾. There was nothing said during the discussion, or at any time while I was in the committee-room or in the lobby, as to the printed copy of the evidence being received as evidence by the arbitrators. It was inserted in consequence of it being stated openly in the town that the local board had been done by the gas company; that the evidence which had been given as to price of coal was erroneous—I am giving the statements which were made to members of the board—and that the actual prices paid for the coal were not anything like what had been stated in evidence before the committee. Having received that information I communicated at once with Mr. Cooper on the subject and it was at my suggestion, after the clauses had been printed, that the addition was made, for the express purpose that the evidence before the arbitrators should be the same upon which we had made our bargain in the House of Commons. That provision was inserted on the 30th of May in the House of Commons.

Cross-examined by Mr. TAYLOR: I cannot point out any one figure or any one item which is untrue; I have no means of ascertaining their truth or falsity. So far as I know, the word "divisible" might have emanated from our own counsel, Mr. Michael.

Mr. TAYLOR: Was not a question raised at my suggestion on account of the apparent ambiguity of that expression, and did not Mr. Michael again define what divisible profits were, as being that they divided £540, and perhaps they might have divided more? Do you mean to tell us that you never took into contemplation that we might have divided more?

Witness: That was its appearance on the evidence—that you might have divided more, because Mr. Boulton said in his evidence that there was one sum of £100 which was retained for the purpose of paying the engineer, or something of that kind. There is no doubt that the partners were perfectly right, if they liked, in dividing every farthing they earned, or in dividing only half.

Mr. TAYLOR: If it is a fact that the profits are the amount stated by the company, would you consider it to be a just and proper thing to compel them to take from you what you supposed those profits to be, although they were very much less?

Witness: I should consider it quite an equitable thing, if they made a representation, upon which I made a bargain, that they should be held to their representation. The company made a representation as to the amount they had divided, and as to the amount they had reserved; and Mr. Boulton stated in his evidence clearly that they had retained some sum of money, and he instanced £100, for the purpose of paying the engineer. We know of that sum, and that sum only.

Re-examined by Mr. SOMERSET: It places us in a very unpleasant condition to find that a distinct contrary statement was made in the account to that which was given upon oath by Mr. Boulton. At the time the bargain was made the board were not at all hot upon the matter. They thought they would throw out the bill; but if the committee had decided against us on the preamble, we were fully prepared to go into clauses for the protection of the consumers and of the inhabitants.

Mr. STEVENSON: Perhaps Mr. Dee will read the section of the evidence he has just referred to; it does quite carry the interpretation he says.

Mr. SOMERSET read an extract from the proceedings at the meeting of the proprietors, which was given in evidence, and which stated that it was carried unanimously that a dividend of £90 be paid for the preceding year, and that the surplus be paid into the bank for the purpose of liquidating the liabilities. It was also reported to the meeting that the new works and buildings were finished, except the weigh-bridge and governor; and it was resolved that £100 be withheld until the completion of the works by the engineer.

Witness said that was the £100 to which he referred.

Mr. *R. W. Cooper*, examined by Mr. SOMERSET.

I have advised the Horncastle Local Board through the whole of this matter. The basis of these negotiations was the purchase of the works at 16½ years purchase of the divisible profits, and it was the subject of very careful consideration by the board at that time, before they assented to the arrangement, as to what these divisible profits were likely to be. Figures were named between members of the board and myself, and we started with the basis of the £540 divided as shown in the accounts, and then it was considered that there might be some further sum which the company would be entitled to divide, and several figures were mentioned. As quite an outside sum Mr. Michael mentioned, even if they amounted to as much as £700 divisible profit, still the board could purchase the undertaking upon those terms. The sum of £18,000, or anything like that, would not have been listened to for a moment. We went practically upon the evidence as to the price paid for coal, in connexion with the maximum price for gas to be fixed in the bill, because we had been contending that the 6s. 3d. which the company were seeking to obtain was too high, and we suggested 5s. 10d., feeling sure that if we carried on the bill ourselves we should be tied to that price. We considered that if the company could make that amount of divisible profit with coal at 23s. 3d., there would be some margin for the local board to conduct the works profitably if they acquired them upon that basis. As already stated, an adjournment was then applied for and granted, and in the meantime the clauses were put into type, as required by the Standing Orders; but those clauses did not contain one word about making the evidence before the committee evidence before the arbitrators. The occasion for so making them evidence did not arise until after the bill had passed through committee; and it then arose in consequence of my hearing from Mr. Dee that reports had got abroad in the town that the company had done the board, and that they had been using a cheaper coal. Mr. Dee wrote to me in a state of great alarm as to the position of the board, they being given to understand that they would have to pay a very much larger sum than had been contemplated when the undertaking had been come to; and he suggested that we should make the evidence before the committee evidence upon the arbitration, with a view of holding the company to what they had said; and that was done. That suggestion, with some other amendments, was submitted by me to Mr. Taylor between the adjournments of the 8th and the 30th of May, and was approved of by him, and we took it through the committee on the latter day in that form. It is not quite in the form in which it now stands in the Act, because Lord Redesdale's counsel required a verbal alteration, so that the copy should be identified in some form, and I suggested it should be identified by the signatures of Mr. Taylor and myself. Then I heard from my clients that they were still in a state of alarm as to the reports which had been put about the town. Mr. Dee came up to London and advised with me; and we had a consultation with Mr. Michael before we went into committee in the Lords upon the express point of whether the evidence, being made evidence on the arbitration, was sufficient to protect the board or not, and Mr. Michael advised that he considered the arbitrators would be bound to accept the evidence given in committee. The matter was in an extraordinary position, because the bill had ceased to be the bill of the company and had become the bill of the board; and if we had attempted anything in the shape of modification in the Lords, it would probably have resulted in a total failure of the whole thing, which would have been a very serious position for all parties; therefore, the conclusion come to was that no amendment should be attempted. Having received Mr. Michael's opinion, my clients felt they could safely rely upon their position.

Mr. TAYLOR said he had no questions to ask.

Mr. SOMERSET said that was his case.

Mr. TAYLOR: Then I tender Mr. Boulton as a witness, for you to examine and do as you like with.

Mr. *Henry Boulton*, examined by Mr. TAYLOR.

I am the secretary of the Horncastle Gas Company and have had the management of the affairs of the company. In pursuance of the provisions of the Horncastle Gas Act, 1876, within 14 days from the passing of that Act, I rendered an account of the receipts and disbursements of the company during the year 1875.

Mr. SOMERSET: Are you going into that account?

Mr. TAYLOR: I am going to vouch it to be correct.

Mr. SOMERSET said in that case he had better at once object to the power of the arbitrators to go into that question. Clause 5 said, "16½ years purchase of the divisible profits of the company," and so forth; but clause 8 was the one he wished particularly to call attention to, and he did not do that upon any technical ground, but upon the strongest ground for wishing the truth to be arrived at. He wished to know what was the intention of that clause, and whether the arbitrators were at liberty to go into any account except that which was in conformity with the evidence given before the House of Commons. The wording of that clause meant something or it meant nothing. The arbitrators knew very well the usual framing of clauses similar to those in Acts of Parliament, and they knew whether it was usual or not to put in such matters as those—that evidence should be considered—without some intention. The evidence of Mr. Dee, and, what was of more importance, the evidence of Mr. Cooper, showed why those words were inserted. It was in consequence of the evidence of Mr. Boulton and what was heard afterwards, that for the safety of the local board it was considered necessary to insert those words; and what was more, Mr. Cooper said that if they could have put in anything stronger they would have done so. He (Mr. Somerset) wished to know from the umpire—who was so conversant with those matters—could a witness be called in chief to contradict a statement actually given upon oath for the benefit of the party for whom it was given? He was not going into the painful question of whether the witness ought to be believed, but he asked, had they a right to contradict their own witnesses? He might be asked why the evidence was to be put in, and why was the copy signed by Mr. Cooper and Mr. Taylor. These words were added by Lord Redesdale and the counsel in the House of Lords for the identification of the evidence, and it was quite right when they had a man present who was going to contradict it. That evidence having been put in, could the arbitrators hear any evidence or pass their decision upon any evidence except that given before the House of Commons? They might have a gentleman coming forward and saying: "This was wrong in this particular or that particular, and I have made a trifling mistake," but could the arbitrators proceed on any other account? He (Mr. Somerset) thought the objection ought to be made at the present time, because, whatever might be the result of these proceedings, there might be proceedings in other courts afterwards, which might be much more serious.

Mr. TAYLOR said it struck him that the objection was rather inopportune, because, if no evidence was to be produced before the umpire except the printed evidence, why had his friend troubled to produce witnesses to explain the accounts prepared by the company, and to show that the amount stated was too much; and, in fact, to prove that the calculations which they themselves put forward as being the correct purchase-money to be paid by them, were also too much. If Mr. Somerset's view of the meaning of the Act was correct, they were utterly debarred from that, and the very argument he made use of showed the fallacy of it, because, if he was debarred from producing any evidence in contradiction of, or to put on one side what the company claimed, how could the local board attain to what they considered to be their just rights? The question was not whether the evidence Mr. Boulton gave before the committee was true or untrue. If it was fraudulently uttered, with the intention of deceiving the committee, and placing a fictitious value upon the works, any agreement entered into under fraudulent circumstances could be set aside in the proper way; but until that was proved to be the case, he (Mr. Taylor) contended the arbitrators had no power to refuse the evidence he should place before them. His clients never for a moment led the local board to suppose that the amount divided was the whole of the divisible profits. It was notorious, that, beside their dividend, they had some money reserved; and, if that was the case, there was nothing before the House of Commons to enable them to arrive at the divisible profits. The question referred to the arbitrators to decide was, what were the divisible profits, 16½ years purchase of which had to be given as the value of the works, and that was really the only question. It was because there was no evidence before the House of Commons to enable them to arrive at a conclusion that it was referred to Mr. Stevenson and Mr. Spice to come to a conclusion, if they could, as to what the profits were; and, if they could not, then it was to be decided by the umpire. He was sorry for his friends on the other side if they had made a bad bargain, and wanted to get out of it. He did not say they had; but, until they proved Mr. Boulton's evidence to be fraudulent, they had no right to exclude it, or to call evidence to show the company's calculations were wrong. He, therefore, most distinctly submitted that the umpire was bound to receive, and hear proved, the account now produced as the account tendered by the company to the local board. If it should hereafter turn out that Mr. Boulton had in any way misrepresented the thing—which he indignantly denied on that gentleman's part, and on the part of the company and everybody else concerned—then the local board had their remedy; but until then he submitted the account must be received.

Mr. SOMERSET said his friend's argument amounted to this—"True, every single syllable which was said by Mr. Boulton practically before the House of Commons was contrary to the fact, but it was not said intentionally," and that was the man who knew everything; but that did not affect in any way the decision of the question. The point was, whether the arbitrators could give any weight to anything but what appeared in evidence before the House of Commons.

The UMPIRE: What you are asking us to do, I think, is, that we should refuse this account which has been tendered, and that we should not hear the evidence which is to be offered upon it.

The arbitrators retired to consider the point, and, on their return,

The UMPIRE said they had unanimously decided to hear Mr. Boulton's evidence upon that document, and to receive it.

Examination resumed: I have here the account which was delivered on the 26th of July to the clerk of the local board.

Mr. TAYLOR read over the various items of expenditure given in the statement handed in on the previous day, the witness stating which of those items he had vouchers for, and which only appeared in the books of the company.

Mr. SOMERSET said the only vouchers he really cared for were those for the coals and the carriage of coals.

Mr. TAYLOR said it would be more convenient to allow Mr. Sandell to vouch those.

Examination resumed: The vouchers handed in are all correct, and the entries of all the payments are in my books. Every one of the receipts appearing on the other side of the account was absolutely received by me, and will be found in its proper place in the books of the company. The total disbursements were £1601 1s. 6d., and the balance applicable for dividend £1341 2s. 3d.

Mr. TAYLOR: We have heard a great deal about this unfortunate discrepancy in the price of coals given by you before the committee, and the price it works out in the books, and the quantities; and I ask you to give your own version of the story, exactly and strictly as it occurred.

Witness: First as to the price of coals. I make up my books from June 30 to June 30 in every year, and I hold in my hand the quantity of coals we had from June 30, 1874, to June, 1875. Those are the prices at the pit, except in two instances, where it wants 8s. 6d. added to them.

Mr. SOMERSET: It is no use putting in a thing which is not correct, and which is not an original document.

Witness: There are two items here of coals bought of a coal merchant in Horncastle, and consequently there was no carriage to pay upon them. All the others are from the pit.

Examination resumed: I can produce vouchers for every one of the purchases of coal from the pit, and also of the two purchases in Horncastle.

Mr. SOMERSET asked to be permitted to examine the vouchers, and to take them away for that purpose.

Mr. TAYLOR said he had no objection to their being produced at all proper times to Mr. Somerset and to the solicitors on the other side, but after the animus which had been shown and the remarks which had been made, he did not feel he should be justified in parting with them.

Mr. SOMERSET said in that case they must be put upon the minutes at a great expense.

Mr. TAYLOR said he should be happy to oblige Mr. Somerset all he could, but they had already had a court of justice held out to them.

Mr. SOMERSET: And we shall probably come to that.

Cross-examined by Mr. SOMESET: I am owner of one share out of six in this partnership originally of £500, but now of £1000, and if this arbitration ends in

our receiving our claim of £22,500, I shall receive nearly £4000 for my share. I am not aware that our object and interest in the House of Commons was to increase our expenditure as much as possible and to diminish our profit. We tried to obtain a price of 6s. 3d. in our bill, and that was objected to by the local board as being excessive. I gave a tabular statement of what our coal cost from 1864 to 1875. We did not want to put any money down which we had never expended. I stated in the House of Commons that the person who was manager before me died without leaving any accounts, and that I was entirely ignorant of the affairs of the company before 1856; and I still adhere to the statement. We only had meetings once a year, when the dividend was declared. I was totally unacquainted with the financial matters; we never had a balance-sheet put before us. In 1856, I became secretary, treasurer, and cashier. For the last 20 years no one has known so much about the company as myself. I believed the statement about the coal average being 23s. 3d. in 1875 to be correct when I made it, but I had never worked it out before.

Mr. SOMERSET: Do you mean to state that you had not cast it up, not once only but 20 times?

Witness: I really had not.

Mr. SOMERSET: You had been five or six years considering whether you would apply to Parliament?

Witness: We were not considering it all that time, and it was never mooted but once before. We discussed it first in 1875, and even then we did not go into all these matters, and consider how we were to frame our bill.

Mr. SOMERSET: How did you obtain what appears in the preamble of your bill—"And whereas the original company have, in addition to the said sum of £3000, actually expended in acquiring land for the purposes of their undertaking, and upon necessary improvements and extensions of the works of the original company, sums amounting in the whole to £8000 and upwards"?

Witness: I obtained it from a statement of capital expended. I did look into the accounts to find that, but I never looked into them as to the coals; coals are not capital. I prepared the tabular statement by looking at the invoices; that was before I gave evidence,

Mr. SOMERSET: And having looked at the invoices and made the tabular statement, you then gave evidence that the price was 23s. 3d.?

Witness: Not the average price, but that 23s. 3d. was the price of the coal in 1875. We also purchased coal in the year at 16s. 6d. I have given you the invoices, excluding the carriage.

Mr. SOMERSET: I ask you distinctly, in these invoices is there a single one for coal at 16s. 6d.?

Witness: There is not; but there is an invoice at 8s., and the other half is for truck carriage.

Mr. STEVENSON: The invoice would be for the cost of the coal only; and there is a separate voucher for the railway carriage. No single invoice would give the cost of the coal.

Mr. SOMERSET: But the double invoice will be the same thing.

Witness: You will find one for 8s., and another for 8s. 6d.

Mr. SOMERSET: Do you deny before the umpire that you told the committee of the House of Commons that you paid 23s. 3d. as the average price of coal in 1875?

Witness: I do not say the average price. I say we paid in the year ending December, 1875, 16s. 6d. and 23s. 3d., and we paid intermediate prices between the two. Whatever Mr. Stevenson said as to coal, or as to any basis for his calculation, was supplied by me, and no one else. The statement of 17s. 1d., which was put into the account, was quite true.

Mr. SOMERSET: You were asked in cross-examination from whom you bought your coals, and you replied from the Strafford Collieries, for the principal part; is that true?

Witness: It is now; we were getting two sorts of coal at the time—Straffords and Flocktons.

Mr. SOMERSET: Is it not the fact that you got nearly double, from 1865 up to the time you are speaking of, from Worsborough, or some such place?

Witness: We did; but from that time we determined to buy the principal part from Strafford. In 1875 it is perfectly true that we had 1700 and odd tons from the Worsborough Colliery and 356 tons from the Strafford.

Mr. SOMERSET: Then you were asked what you paid at the pit's mouth, and you said 12s. 6d.; but that had only been for a month or two, previous to which it was 13s. 6d.

Witness: It ought to have been more—it ought to have been 14s. 6d.; but I did not remember it at the time.

Mr. SOMERSET: You had prepared yourself, and looked at the invoices, and so on; and now you put it in your account that it was only 17s. 1d., including the 8s. 9d. Does it not appear in your account that you have been using gas nuts in the proportion of three or four to one, as against the best coals?

Witness: We used about double in 1875.

Mr. SOMERSET: Do you mean to tell the umpire that you did not wish to impress the committee with the fact that you dealt with the Strafford collieries and none others?

Witness: No; I did not. We have for years been using the best coals, but not always.

Mr. SOMERSET: You said, "We have been buying the best house coals for years; we do not like gas coal." Up to the very time of making that statement, you knew thoroughly well, did you not, that the great majority of your coal was coming from Worsborough?

Witness: We were buying in the proportion of two to one.

Mr. SOMERSET: That tabular statement was in your mind when you gave that evidence; tell me one single word of truth there is in it?

Witness: I mean to say that during the year 1875 we bought coals at 16s. 6d. and 23s. 3d.

Mr. SOMERSET: Did you, in the year 1875, put any coals which you had purchased in that year for a larger sum than 17s. 6d., including carriage, into the retort-houses?

Witness: No; all the coals purchased in 1875 were screened nuts.

Mr. SOMERSET: I wish to have the matter explained to me. Mr. Boulton says that he paid 23s. 3d., and now he admits that no coal was put into the retort-house in 1875 for which more than 17s. 6d. was paid.

Mr. STEVENSON: The question was, "From whom do you buy your coal?" and he might have been referring to 1876.

Witness: If you will allow me to explain how that tabulated statement was made, it will save a great deal of trouble. We bought some nuts during the year at 11s. We have been buying coal from Strafford for the last two years.

Mr. SOMERSET: Had you any coals except nuts from the Strafford collieries in the year 1875 and a portion of 1876, up to the day you gave your evidence, which cost less than 12s. 6d., besides the carriage?

Witness: We bought nothing but nuts in 1875, taking that as a year by itself.

Mr. SOMERSET: In reply to the question, "Then for some years you have made your gas of house coal and not of gas coal?" you say, "Yes, but during the coal famine we were obliged to buy nuts, or anything we could get." Was 1875 the time of the coal famine?

Witness: No, it was not.

Mr. SOMERSET: Is there any single syllable of that answer, in any shape or form, true, or anything like it?

Witness: I say there is, because the best Strafford nuts are the best coals.

Cross-examination continued: The tabular statement I put in was compiled from June, 1874, to June, 1875; but there is no portion of my evidence which shows those dates. I was asked by our solicitors to prepare the statement. When it was put in, there was no explanation given to show that it was not what it appeared to be.

Mr. SOMERSET: Is not the statement that you paid 23s. 3d. in 1875, in every instance untrue?

Witness: We did not pay 23s. 3d. in 1875.

Mr. SOMERSET: May I ask you, as a man of business, do you really pretend that your statement is one that can be trusted to guide anybody to a just conclusion?

Witness: I say we passed our accounts from June to June, and that table was compiled in that way all through. I did not say so before the committee, because I was not asked the question. I instructed Mr. Stevenson as to the price of coal, and everything else; but I cannot say I heard his evidence, because I am very hard of hearing. I read it afterwards; but I did not tell him it was wrong.

Mr. SOMERSET: You gave Mr. Stevenson this on the day after you gave your evidence:—*Q.* "What do you put as the cost of coal at the present time?"—*A.* "I have not taken the present time, but the average of last year. The average cost of coal last year was 22s. per ton at the railway." *Q.* "What do you pay for hauling and trimming?"—*A.* "1s. 3d." *Q.* "So that you put the cost of the coal hauled and trimmed at 23s. 3d.?" That is the figure you gave Mr. Stevenson as the average price of coal in 1875—is that so?

Witness: The average price according to that tabular statement. All our invoices were from June to June, and I took them in that order and prepared that statement. There was no one else with me; I prepared it all myself.

(To be continued.)

PROPOSED STANDARD PHOTOMETER FOR MEASURING THE ILLUMINATING POWER OF GAS.

The Tenth Annual Report of the Warden of the Standards (for the year 1875-6), made to the Board of Trade, and laid before Parliament, has just been published, and from it we extract the following remarks in reference to the above proposition:—

As connected with the question of gas-measuring standards, which have been legalized by Parliament as the primary instruments for determining in an uniform manner the *quantity* of illuminating gas supplied and sold to the public, attention may here be called to the question of legalizing a standard photometer, for measuring also by an authorized uniform method the *quality* or the illuminating power of coal gas supplied and sold to the public.

The principle of the photometer, so far as regards the comparison of two lights for the purpose of measuring the relative difference of their illuminating power, was first brought into practical use by Count Rumford, in 1794. His method consisted in observing, by the eye, the equalization of the shadow thrown by each light on a white surface illuminated by both of them at once. The difference of illuminating power was computed, from the relative distance of the two lights, in accordance with the ascertained fact that the intensity of light varies inversely as the square of its distance. An improvement to Rumford's method was made by Bunsen, who introduced an opaque disc of greased paper between the two lights, for better observing the intensity of these shadows. Bunsen's method was greatly improved by W. King, engineer to the Liverpool Gas Company, who was the first to make it practically available for testing the illuminating power of gas, by referring it to the light produced by a wax candle, as a standard of illuminating power.

Such a standard of the illuminating power of coal gas was first legalized by Parliament in 1849, under the provisions of the Great Central Gas Company's Act of that year. In pursuance of the recommendations of a report by Professor Graham, Dr. Leeson, and Mr. Cooper, the standard of the illuminating power of coal gas, and to a certain extent the method of determining it, was prescribed in the Act. It was provided that the illuminating power of the gas sold was not to be less than the light produced by 12 wax candles, six to the pound, each consuming 120 grains of wax per hour, the gas being burnt at the rate of 5 cubic feet an hour from an Argand burner of 15 holes, with a 7-inch chimney. In 1852, upon a further report from the same scientific authorities, a sperm candle, with a plaited wick, was substituted for the wax candle as the standard of illuminating power for the Great Central Company's gas; and two sperm candles were used instead of one, in order that the light might be intensified and the rate of combustion equalized. The method employed at a somewhat later period was to cut a sperm candle in half, and to burn each half down from the middle to the ends. The reason assigned for the change from wax to sperm was, that "wax burns with much less regularity than sperm;" and that "spermaceti appears to be greatly preferable to wax for the trial candle for photometric experiments." The standard 12 wax candle gas of 1849 is stated to have been equivalent to the 9½ sperm candle gas of 1852.

The first public Act fixing the standard unit of gaslight was the Metropolis Gas Act of 1860, 23 & 24 Vict. c. 125. Section 25 provides that the common gas supplied shall be "such as to produce from an Argand burner, having 15 holes and a 7-inch chimney, consuming 5 cubic feet of gas an hour, a light equal in intensity to the light produced by not less than 12 sperm candles of six to the pound, each burning 120 grains an hour."

This standard candle unit of gaslight has since been continued in the several local and personal Acts obtained by the several metropolitan gas companies, and by other gas-producing companies and corporations throughout the kingdom. But an important alteration, so far as regards the method of testing the illuminating power of gas, was made in 1868, by the City of London Gas Act. Gas Referees were to be appointed by the Board of Trade, with the duties of testing the illuminating power of the gas supplied by the companies. Under this Act, the Referees were (s. 40) to "prescribe and certify what testing-places and what apparatus therein for testing the illuminating power and purity of gas shall be provided by each company;" and (s. 42) to "prescribe the burner for testing the illuminating power of the gas, and it shall be the most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer."

These powers of the Metropolitan Gas Referees were extended to other of the metropolitan gas companies in subsequent Acts obtained by them, and practically the Referees now prescribe the mode of testing the illuminating power of gas supplied by the metropolitan companies, including the photometer and burner, and the method of using them.

Since the appointment of the Metropolitan Gas Referees under the Act of 1868, compulsory clauses have been inserted by Parliament in all Acts obtained by gas companies throughout the kingdom, under which the illuminating power of the common coal gas supplied to consumers must not be less than the light of 12 candles. Provisions are also inserted for appointing persons to test the quality of the gas, and for inflicting penalties when it is found below the standard.

As regards the instrument actually in use for testing the illuminating power of gas in pursuance of these Acts, the King photometer was used up to 1850, when it was superseded by what is known as Evans's 100-inch photometer, first constructed by Sugg, in 1858, under the directions of Mr. F. J. Evans, engineer to The Gaslight and Coke Company, and afterwards appointed by the Board of Trade one of the Gas Referees. The Evans photometer, with some modifications since introduced, is now much used in this country, particularly by gas companies supplying gas of a high illuminating power.

From its peculiar construction—no dark closed room for the operations being required—it is also used exclusively in all hot climates abroad. The graduated bar for measuring the distance of the lights is 100 inches long, and is fixed outside the photometer frame. The tested gaslight is fixed inside the frame, a

few inches from the bar, and opposite to 0 of the scale. The opaque disc is fixed 50 inches from the tested gaslight, and in a line from it parallel to the bar. It is, therefore, opposite to the middle of the graduated bar. The two testing candles, which are placed close to each other in a line normal to the bar, are made to slide in the same line parallel to the bar, until their combined light on the opaque disc is observed to be equal with the gaslight, when the illuminating power of the gas is read off in number of candles from the engraved figures on the bar, corresponding with the graduated line opposite to the testing candles.

In the Evans photometer, as well as other photometers presently to be mentioned, there are numerous contrivances for measuring and regulating the pressure of the gas, for ascertaining the weight of the double candle burned in the prescribed time, for observing the temperature and barometric pressure, for testing the gas for sulphur, &c., further reference to which is not here required.

The Letheby 60-inch photometer was designed in 1863 by Dr. Letheby, and it was first constructed by Sugg for the City of London. It was adopted as a standard photometer by the Metropolitan Gas Referees, to be used in accordance with their special directions. It is also much used both in the Metropolis and throughout the country for testing the quality of gas, and has been adopted as the standard photometer in Canada. The frame or outer case of the Letheby photometer forms a dark room, in which the observer is placed. The tested gaslight and the standard double candle are fixed at each end of the bar, and the disc, placed between them, is moveable upon the graduated bar. A full description of the 60-inch bar will presently be given.

Another description of photometer, known as Lowe's Jet Photometer, from its introduction by Mr. G. Lowe, C.E., was first constructed by Sugg, in 1864, and improved in 1868; although, as I am informed, the principle of its construction had been adopted in Edinburgh some time previously. It is based on a different principle from that introduced by Count Rumford, and carried out in the before-mentioned photometers, as it indicates the illuminating power of gas from the quantity required, under specified conditions, to maintain a flame 3 inches high. It is thus a 3-inch flame test. Though not hitherto recognized as a standard photometer in this country, it is very much in use by manufacturers of gas throughout the world, and is, as I am told, recognized as a standard in Italy.

Another photometer, based on the same principle—the illuminating power meter—has more recently been constructed by Sugg. It is claimed that by this instrument the quality of the gas can be determined in one minute from the quantity of gas (measured by an experimental meter, which is a portion of the apparatus) that is required to maintain a flame of gas 3 inches high for 60 seconds.

With regard to these photometric instruments, it may here be remarked that however desirable it may be to legalize a standard photometer for measuring the illuminating power of gas, and to make regulations for verifying copies of such a standard photometer throughout the kingdom, and to determine a uniform method of using these photometers under specified conditions, yet the time has not arrived when any photometer hitherto constructed can be relied upon for giving constant accurate results. The difficulty lies in obtaining, as a standard, a testing-candle or other light that gives the same amount of illuminating power under the same conditions. Hitherto, no better standard unit than the sperm candle has been found. It is known, however, that few of the regulation sperm candles burn at the exact rate specified, and, practically, their rate of consumption varies from about 115 up to about 126 grains per hour. The light of sperm candles is also affected by any difference in the quality of their cotton wicks and in the plaiting. Nor does any one sperm candle continue to give a uniform light, as the amount of light and of sperm consumed depends on the varying state of the wick. Again, there is no certainty of the sperm itself being of a uniform quality, and that the same amount of light is produced from the consumption of a given weight. I have received information that a sperm candle recently brought from Russia, and tested here against a regulation sperm candle, was found 10 per cent. better in quality, and to have proportionately increased illuminating power.

It is of importance to add that, in the event of any standard photometer being legally adopted, it is absolutely necessary that authoritative regulations for a uniform mode of using it be also imperatively required.

If, however, the illuminating power of coal gas supplied to the public is to be determined by referring the light given by it to a standard light, an instrument should be adopted that may really be relied on as a standard. Hitherto, the sperm candle is the only standard of light that has been recognized by the Legislature. But further experiments are now being made with the jet photometer and the illuminating power meter, in both of which the amount of light given out from gas, under determinate conditions, is measured by the height of the flame. These two photometers are claimed to be more accurate measuring instruments, inasmuch as no standard light is required with them. In all the photometers which have been mentioned, there is the further difficulty in regulating the form of the burner, and experiments show that a burner that answers well with one of these photometers in testing 12-candle gas, will not test 18-candle gas with the same accuracy.

Attempts have also been made to adopt as a photometer the radiometer, the instrument recently invented by Mr. Crookes, as showing the mechanical force of light. But his more recent investigations lead to the conclusion that the movement of the arms of the radiometer is due, not to the force of light, but to "the action of the thermometric heat between the moving surface and the glass case of the instrument, through the intervention of the residual gas."

The question of legalizing a standard 60-inch Letheby photometer in this country, as it has already been legalized in Canada, as practically the best instrument for measuring the illuminating power of gas, is, however, well worth consideration. Although we can hardly look forward to obtaining scientifically accurate results, we might, at least, secure a uniform mode of testing the quality of gas throughout the country. If it was considered necessary to legalize standards for measuring the quantity of gas, and to make regulations for verifying copies, and for the stamping and inspection of gas-meters, although these instruments are hardly to be depended on for showing accurately the *quantity* of gas sold, it appears to be equally necessary to adopt the best practical method in our power for uniformly testing the *quality* of gas sold, in accordance with the requirements of the Legislature.

It is hardly within my province to refer to the means adopted for testing the purity of coal gas, in regard to its chemical composition as distinct from the illuminating power, and more especially for ascertaining the per centage of sulphur contained in it, as this part of the subject does not appear to require any similar standard instrument of actual measurement. This testing of the purity of gas is, however, considered by Parliament to be as imperatively required for the security of the public as the testing of the illuminating power of gas, and clauses for this object are now inserted in every gas Act, and it appears consequently to be as necessary that a *uniform* method of testing the chemical quality of gas should be authoritively determined upon as one for testing the illuminating power. A sulphur-testing apparatus forms part of the Letheby-Bunsen photometer.

A brass standard scale, accurately graduated, has recently been constructed by Messrs. Troughton and Simms for the Standards Department, with a view of its being constituted the standard of the 60-inch graduated bar employed in the photometer, now generally used for testing the illuminating power of gas, known as the Letheby-Bunsen photometer. The figures engraved on the scale, corresponding with the several graduated lines, are meant to show the illuminating power of the tested gas expressed in number of standard candles, according to the relative distance of the gaslight and the two standard candles from the opaque disc previously described. The distance of each division, from the end of the 60-inch bar, is computed from the principle that the illuminating power of a light decreases in proportion to the square of its distance, and is found from the formula

$$60 \frac{\sqrt{c}}{1+\sqrt{c}}$$

where c represents the division of the scale expressed in standard *candles*, the legal unit of the illuminating power of coal gas under the Metropolis Act of 1860.

This standard photometer scale has now been carefully verified as to the accuracy of the several graduated lines marked upon it.

A similar standard photometer scale was verified last year in the Standards Department for the Government of Canada, the 60-inch Letheby photometer having been legalized by the Canadian Legislature as the instrument for determining the illuminating power of gas throughout the Dominion.

The brass bar upon which the graduated scale is engraved is 60 inches long, 2 inches wide, and half an inch thick, reduced in weight by one of the 2-inch wide surfaces being bevelled off three-fourths of its width.

The graduated lines with the figures denoting the number of candles and half candles are engraved at the following distances *from each end of the bar*, commencing with 1 at the middle of the bar:—

Candles.	Inch.	Candles.	Inch.	Candles.	Inch.
1 equal	30·00	11 equal	46·10	21 equal	49·25
1½ "	33·03	11½ "	46·34	21½ "	49·36
2 "	35·15	12 "	46·56	22 "	49·46
2½ "	36·75	12½ "	46·77	22½ "	49·55
3 "	38·04	13 "	46·97	23 "	49·65
3½ "	39·10	13½ "	47·16	23½ "	49·74
4 "	40·00	14 "	47·35	24 "	49·83
4½ "	40·78	14½ "	47·52	24½ "	49·92
5 "	41·46	15 "	47·69	25 "	50·00
5½ "	42·06	15½ "	47·85	25½ "	50·08
6 "	42·61	16 "	48·00	26 "	50·16
6½ "	43·10	16½ "	48·15	26½ "	50·24
7 "	43·54	17 "	48·29	27 "	50·32
7½ "	43·94	17½ "	48·42	27½ "	50·39
8 "	44 33	18 "	48·56	28 "	50·46
8½ "	44·68	18½ "	48·68	28½ "	50·53
9 "	45·00	19 "	48·80	29 "	50·60
9½ "	45·30	19½ "	48·92	29½ "	50·67
10 "	45·58	20 "	49·04	30 "	50·74
10½ "	45·85	20½ "	49·15		

The lines on the brass bar defining these several distances have been compared with our subdivided standards of length, and have been found correct.

AMERICAN GASLIGHT ASSOCIATION.

WEDNESDAY, OCT. 18, 1876.

(*Continued from page* 781.)

At the afternoon sitting a discussion took place on the paper read by Mr. Cathels.

At the request of the secretary, Mr. CATHELS explained at length the details and principles of his gas-washer, a model of which was placed on the stage in view of the members, as were also a series of drawings representing retort-settings.

The SECRETARY asked Mr. Cathels to explain some of the characteristics of his method of retort-settings.

Mr. CATHELS: The only difference between this and the ordinary method is that, in one case, as I have already described in speaking of the apparatus before you, it is longitudinal or running heat, and in the other it is vertical heat. The heat plays all around the retorts at right angles to them. The drawings are too small to be easily understood, but the chief characteristic is that the retorts are divided into two or three lengths. In the case of the two chambers the heat plays around the retorts and, striking against the retorts, passes through the openings of the cross wall, and descends among the retorts between the division wall and the oven. The division wall is usually 9 inches thick. It requires very large drawings to illustrate the plan thoroughly.

The SECRETARY: What proportion of coke, on the average, is necessary for your best setting?

Mr. CATHELS: I can only answer that by taking the experience of a half a dozen successive years, during which time I have used these settings, with seven retorts of 21 inches by 15 inches internal diameter, each charge taking a ton of coal. That is what I used at Sydenham, England. At Montreal we have the same setting, and the consumption of coke fuel is just about identical. The Nova Scotia coke is not quite as good as the Newcastle coke, but it requires very little more. With these settings we sold 87 per cent. of the coke. In reckoning the result I have calculated, not upon bushels, but upon the English method of calculating by chaldrons. Assuming that a ton of coal produces a chaldron of coke, and that we carbonized 100 tons of coal, the per centage used would be about 13 per cent., and, as I have stated, we have sold 87 per cent. of the coke from the 100 tons that we carbonized. Putting it in bushels—it takes eight sacks, of three bushels to a sack. That would be twenty-four bushels of coke for twelve hours, and sixteen sacks for twenty-four hours.

The SECRETARY: How many retorts have you?

Mr. CATHELS: We have seven.

The SECRETARY: You made your estimate of 24 bushels of coke for seven retorts at 12 hours?

Mr. CATHELS: Yes.

Mr. CARTWRIGHT: Why base it upon 12 hours? Why not reduce it to 48 hours?

Mr. CATHELS: I take 12 hours because we put one gang of men against another, for that length of time, to see which gang does the most. One foreman works a gang during the day and another during the night, and we compare the amount done by one gang with that done by another.

A MEMBER: How much yield of gas do you get out of a retort on a 12-hour charge?

Mr. CATHELS: We get 5000 feet on an average. I ought to explain that we have stored these coals. We cannot make as much gas out of a coal that we have had on hand for some time as we can get from freshly-mined coals. I suppose we could get from coals fresh from the mine probably 9500 feet. These coals upon which I have made my estimate were stored. We could make, with freshmined coals, perhaps a few thousand feet more. We do not get more than 5000 or 5500 feet, perhaps, on an average in a 12-hour charge?

The SECRETARY: What yield do you get per pound?

Mr. CATHELS: I cannot say positively as to that. I have not figured it upon that basis. We get about 9500 feet per ton on coals that are fresh-mined. I never had an opportunity of using either Penn or Youghiogheny coals. I cannot say what would be the yield from these coals, nor have I figured what the yield would be from Nova Scotia or Lower Province coal, per pound.

Mr. CARTWRIGHT: I notice, in the reading of your paper, an allusion to works that had been constructed upon some plan or other that entirely failed in the course of three months. Can you tell us whether it was owing to a defective

plan of the settings, or to the material of which they were composed, or was it owing to the foundation of the benches?

Mr. CATHELS: I ought to explain to the Association that I did not see the retorts myself; but I heard an account of them from one who saw them and knew about them. Mr. Littlehales can give you more information upon that point perhaps than I am able to do.

Mr. LITTLEHALES: I saw the retorts when they were set, and my opinion is that they gave way simply for the reason that they were not properly supported. If retorts are put up, and are not sufficiently studded, though the retorts may be very good, they will not stand. If the retorts are not made sufficiently strong when they are put up they will come down.

Mr. CARTWRIGHT: I, myself, have seen retorts which were put up and which came down in two or three months owing to the fact that they were insecurely supported, and not owing to any defect of the plan upon which they were set, and I asked the question of Mr. Cathels for the purpose of gaining information upon that point.

Mr. CATHELS: I have been the manager of gas-works for 25 years, in this country and in England, and I say from my own experience that it must be owing to some defect in putting up the retorts if they come down in three months. There is often very great mismanagement in the setting of retorts. It is a very frequent occurrence that retorts are put in and remain for many years, and, on the other hand, it sometimes happens that retorts are put in and only stand for a few months, which is owing, in my opinion, to the fact that they have not been properly put up. There must be something radically wrong in the setting of the retorts if they come down so soon. Sometimes if a retort has been put up for six months, cracks will appear in it. For my part I do not care about cracks in a retort. The principal thing in setting them up is to be careful that they are securely supported. If that is the case the appearance of cracks makes but little difference. In my own opinion it has frequently happened that cracks have made their appearance in the retorts, but after a couple of charges or so they would be as tight as ever.

Mr. CARTWRIGHT: Do you know whether the fault in the retorts of which you have spoken was owing to some defect or neglect in the management of the stokers?

Mr. CATHELS: There is very frequently some mismanagement in that respect also.

Mr. CARTWRIGHT: I have seen trouble arise in this way in my own experience; and, in putting the question to Mr. Cathels, I was anxious to get at the fact whether the defect in the retorts, of which he spoke, was owing to a defective plan, to mismanagement on the part of the stokers, or to defect in the material employed.

The SECRETARY: I would like to ask Mr. Cathels whether there are any retorts, to his knowledge, set after his most approved setting in the States?

Mr. CATHELS: I am not prepared to answer that. I have supplied tracings of some of these settings to one or two gas companies in different places; but I never have had since that time any communication from them in regard to them, and, therefore, I am unable to answer the question.

Mr. WOOD: In New Bedford we have some retorts put up after the manner of Mr. Cathels's plan of setting—though I cannot say that they are put up according to his best plan, as he has described it. Our benches are small ones, 6 feet 8 inches inside in width, consequently the retorts are small. But we are now using three benches of these retorts, with 160 pounds to a charge, which is all our consumption calls for. Our benches not being quite large enough, we are using them with 84 bushels of coke for 24 hours, and saving from 170 to 190 bushels a day, with a charge of 160 pounds. You may say that it is a very small charge, and it is. Our retorts are only made to carry 180 pounds. We are using Penn coal, with a little Newburgh Orrel. We use that because we find that we can make better gas with two kinds of coal, one an inferior kind mixed with a higher grade. The retorts, as I said, are rather small. The old sizes are 12 inches and 20 inches by 8 feet long; the better ones are 14 inches by 22 inches, and 6 feet in the base. The quantity of gas produced in 24 hours depends entirely upon the amount of coal we put in. In small works like ours we cannot run our retorts to their full capacity. There is a great jump from two benches of threes to two of sixes. We made 4·70 feet to the pound during the eight months this year. Our average has been 4·94 to the pound in other months, but our yearly average will be about 4·70. The minimum illuminating power of the gas is 17 candles, and the maximum about 20. Our loss has been between 11 and 12 per cent. per annum. This year it will be about 10. We are making about 80,000 feet per day.

Mr. CARTWRIGHT: Do I understand you to say that you produce on an average 80,000 feet per day, at 4·70 to the pound, with Penn coal and Orrel?

Mr. WOOD: Yes. Our experience is that Penn coal and Orrel make as clear a gas as Penn coal makes alone, in our works, and a brighter gas.

The report of the Finance Committee was then brought up and accepted; the Treasurer's report was also adopted.

The officers and committee for the ensuing year were then elected as follows:—

President—General Charles Roome.

Vice-Presidents—W. H. Price, Cleveland; George B. Neal, Mass.; T. Littlehales, Canada.

Secretary and Treasurer—Charles Nettleton, New York.

Finance Committee—John S. Chambers, Trenton; J. P. Harbison, Hartford; George McIlhenny, Washington.

Executive Committee—W. H. Denniston, Pittsburgh; George D. Cabot, Mass.; A. Hickenlooper, Cincinnati; Henry Cartwright, Philadelphia; Wm. H. White, Brooklyn; Henry Stacey, Indianapolis.

The PRESIDENT having returned thanks for the compliment paid him by his re-election, called upon Mr. Sherman, of New Haven, to read a paper on "Naphthaline."

Mr. SHERMAN: Our worthy and enthusiastic secretary, without any consultation with me, and upon a conditional promise, has put me down for a paper on "Naphthaline." I have not, for reasons which I will presently give you, prepared any paper on the subject. In my own experience I have used various devices for getting rid of naphthaline. I have suspended mains around the retort-house walls. I have had Graham's coil condenser, and have used the expedient of putting naphtha in the purifiers, and in the drips, but with no great success. The New Haven Gas Company, from plans and specifications of Mr. William Farmer, erected what is called a tar scrubber; and their experience justifies, so far, all the expectations which were raised in regard to that apparatus. I had intended to present a paper describing this apparatus; but Mr. Farmer has very kindly furnished me a description of it, which is so much better than anything I could give, that I propose to have his paper read *verbatim*.

Captain DRESSER, at the request of Mr. Sherman, read the following paper:—

SMITH AND FARMER'S CONDENSER AND SCRUBBER.

Gentlemen,—Though the majority of gas engineers have, for some time, been fully convinced that the gas and tar should be kept well in contact for a certain time immediately after they leave the hydraulic main, no efficient apparatus has yet been introduced that has thoroughly answered the purpose.

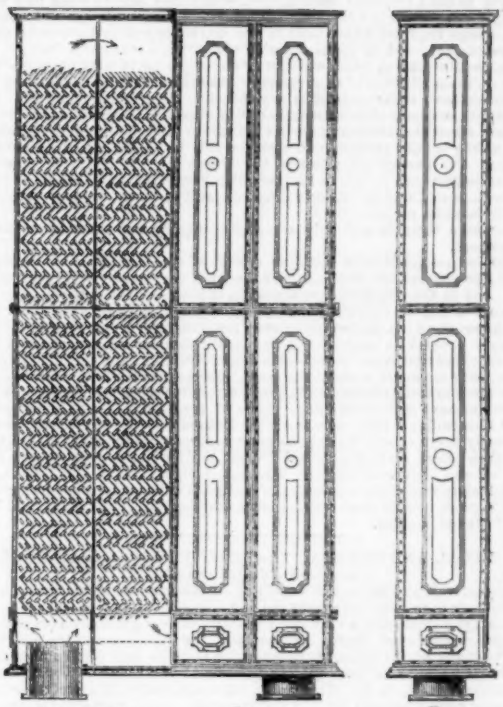
Some engineers carry the gas two or three times round the retort-house walls, in mains, which are hung on the walls of the house; but it is easily seen that this system is a very roundabout one for carrying out the idea, for the gas is not kept thoroughly in contact with the tar. The gas deposits the tar on the bottom of these mains, and the gas merely passes over it; hence the tar and ammoniacal liquor are not thoroughly utilized before they escape to the tar-well.

When the hot gas, tar, and ammoniacal liquor are kept well in contact, we find that it enriches the gas, and removes a considerable portion of the carbonic acid and sulphuretted hydrogen from the gas; and it also prevents the deposit of naphthaline in the mains and services.

I will now introduce to your notice a very simple and efficient apparatus, which has been found to answer the purpose admirably.

This apparatus can be made with one or more shafts, and of any area and height to suit the capacity of the works.

Each shaft is filled in with diagonal plates, each about six inches, and placed about two inches apart. The said plates are all supported on lugs or projections which are cast on the side plates, and all the diagonal plates are so set that the hot liquor which is deposited on the plates by the gas, must fall from one plate to the other in its passage down the shafts, and consequently must make a series of drips through which the gas must pass, with a zigzag motion, in its passage through the apparatus.



LONGITUDINAL SECTION. SIDE ELEVATION. END ELEVATION.

This arrangement keeps the hot liquor much longer in action than any other, consequently it must be much more efficient.

This apparatus should always be erected in a warm building, and as near to the hydraulic main as possible.

From this apparatus the gas should next pass on to the ordinary multitubular condenser, to be reduced to the proper temperature before it enters into the water scrubbers.

[The author proceeded to quote some observations of Mr. Lewis Thompson which appeared in an early volume of the JOURNAL OF GAS LIGHTING, and also from Bowditch's "Analysis and Use of Coal Gas."]

The zigzag scrubber has been designed in accordance with the suggestions of Mr. Bowditch, and the results obtained from the one erected at the New Haven Gas-Works in 1874 have certainly verified most of his predictions.

As the Graham condenser was designed for the same purpose as the zigzag scrubber before mentioned, I will give from the JOURNAL OF GAS LIGHTING a description of the apparatus, and also some of the results. [The author quoted from Vol. xxii., page 765, and Vol. xxiv., page 431.]

Though the Graham condenser is similar to the system of placing the gas-mains round the walls of the retort-house, we see from the preceding extracts that it is a valuable arrangement for removing impurities from the gas, and improving its illuminating power by taking up the lighter hydrocarbon vapours; therefore it will save enrichers, lime, labour, and deposits of naphthaline in the mains and services.

As the zigzag and drip system makes a much more compact apparatus than Mr. Graham's, and also lets the gas pass through it at a much higher temperature, I think it will produce better results.

High heats *do not* really produce more naphthaline in the retorts than low heats, though it is generally supposed that they do; but the high heats produce much less tar than the low heats, consequently the high heats do not produce enough to purify the gas by the ordinary method, and therefore we are troubled with the naphthaline in mains, &c.

To get over this difficulty we must adopt an apparatus that will keep and utilize all the hot tar that we do get, and not let it cool immediately and escape to the tar-well.

(To be continued.)

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

During the week just ended there has been no special change in either direction in the condition of the general iron trade, current employment being only of a moderate nature. Despite this, however, I shall not be greatly surprised to find that very early in the new year there will be a general movement on the part of manufacturers towards higher prices. There is, even now, a disposition to insist upon higher quotations for certain classes of iron, the raw materials being conspicuous in this respect. Almost all kinds of pig iron are held with considerable firmness, the following being the nominal prices at which local brands are quoted:—No. 1 foundry, 51s.; No. 2 foundry, 49s.; No. 3 foundry, 47s. 6d.; No. 4 foundry, 45s. 6d.; No. 4 forge, grey, 45s. 6d.; No. 5 forge, mottled, 44s. 6d.; No. 6 forge, white, 43s. 6d.; refined metal, 67s.; Kentledge, 51s.; and cinder pig, 40s. per ton for net cash, free on rails. Aireside Leeds No. 1 is 49s.; No. 3, 47s. 6d.; foundry, 46s.; and forge, 45s. North Lincolnshire "Redbourn Hill," No. 1, is 60s.; No. 2, 56s.; No. 3, 54s.; No. 4 foundry, 54s.; No. 4 forge, 51s.; mottled, 50s.; and white, 50s.; with the usual 2½ off for cash. In all probability these are the lowest prices we shall see for the next

few months, unless by the breaking out of war, or other unexpected causes, the revival of trade be stopped. In merchant iron there is no change, nor is there much business doing in those articles.

Fuel continues abundant, and is still quoted at purely nominal rates. In most cases buyers have the advantage, there being great competition amongst all classes of vendors.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

At some of the pits small advances are being made this month on round coal, but this is mostly in cases where they happen to be oversold, and there is no general alteration upon last month's quotations. There is a good demand for the better classes of round coal, and prices are stiff. Holders of gas coal fully maintain late prices, and in the Manchester market a few inquiries have been coming to hand for home consumption, which may lead to some new business being done. There is a fair amount of shipping going on in gas coal; but some of the large inquiries which were in the market appear to have fallen through for the present; and it seems probable that foreign consumers have, in many cases, small stocks on hand, which they are preparing to work up before buying largely, in anticipation of some change in the market; but of this there is not much prospect, so far at least as any reduction in price is concerned. In the inferior descriptions of fuel the market continues dull; and although the better sorts of steam coal and burgy are not difficult to sell at late prices, common sorts are a drug in the market, and slack is still being pushed at extremely low prices. The average pit prices in the Wigan district remain much about as under:—Best Arley, 11s. to 12s. per ton; Pemberton four-feet, 9s. to 9s. 6d.; common coal, 7s. to 8s. 6d., according to quality; burgy, 5s. 6d.; and ordinary slack, 3s. to 4s. per ton.

For coke there is still only a moderate inquiry, and prices are without improvement.

The wages question is agitating several of the Lancashire mining districts. In the neighbourhood of Manchester there is a very uneasy feeling amongst the men, and in the Wigan district notices have been sent out to the masters for an advance of wages which shall place them on the same level as in May last. So far, however, as the colliery proprietors are concerned, I may state that they are strongly opposed to entertaining any application for an advance of wages at present; and without a considerable improvement in the condition of the coal trade, they are not in a position to pay higher wages than they are now doing.

In the iron trade of this district prices continue very firm, but there is only a limited amount of business doing. Some of the Lancashire makers of pig iron have been selling a little more freely for forward delivery at present prices; but generally they are still disinclined to quote for anything except early delivery; and their prices are stiff at about 57s. per ton for No. 3 foundry, and 55s. for No. 4 forge, delivered into the Manchester district. In Middlesbrough and Lincolnshire iron there is no material change to notice. Finished iron continues firm in price, and for local bars delivered into the Manchester district £6 17s. 6d. to £7 per ton is asked.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The arrivals and sailings of vessels of all descriptions in connexion with the Tyne have been very large since mp last. Business has been extremely active at the Tyne Dock, and a very great quantity of best gas coals have again been shipped from thence, mostly by steamers. The best gas coal trade is the most active of any on the Tyne, or indeed in the Durham and Northumberland districts. The rates for best gas are from 9s. to 10s. per ton. For second-class from about 6s. 9d. to 7s. The period has commenced for large gas companies to enter upon contracts for the ensuing year. Some extensive contracts were made by continental gas companies last week in the Tyne, to run over next year, at a trifle less money than the quotation for best gas coals given above. Second-class gas coals are tolerably abundant in the market. They are likely to be so all through the winter, as there is not any very perceptible improvement in local demand to prevent a large amount of coals, which may described as second-class gas, from being pressed into what may be termed the external market for shipment. A good deal of inferior coal is still sent direct to the Continent by the collieries through their own steamers, and upon consignment, to realize whatever they will fetch in the market. The turns for best gas coals are about a week. House coals are in quiet demand. Steam coals remain in the same depressed condition as noted last week. By the end of the year, without the Northumberland steam coalowners and their workpeople come to terms, with a view to make more round and less small coals, there will be a crisis in that trade, which might affect other branches of the coal trade awkwardly. The difficulty, however, it is expected will be tided over.

Last week considerable fleets of coasters sailed from the northern coal ports for the south, and within the compass of the next four or five days it is quite possible that a large quantity of coal will be delivered at the bye-ports. At any rate, few orders will be given out until the cargoes of coals that are at sea are to hand at the port of delivery to discharge. Coasting rates generally were, therefore, a trifle lower last week—possibly something like 3d. per ton. Steamers continue to come out of the Baltic trade, and are placed in the coasting. The coal trade to the Mediterranean was not quite so brisk last week either, and the freight market, upon the whole, was a little more favourable to shippers.

The Cleveland iron trade was steadier last week again. A considerable speculative business has suddenly sprung up in iron shipbuilding. More new commercial steamers are on hand in the northern ports of England—and, indeed, in all the iron shipbuilding places of the kingdom—than have been noticed within the past two years. There has also been a good deal of new business entered upon in marine engine building, and part manufacturing iron has been shipped to the Continent. These, and a few other trifling circumstances, are lifting the iron trade of the North from the gloom that has surrounded it so long. But whether the revival is temporary or will go on is a matter for time to determine. It is evident, however, that not only in the iron trade, but in other trades in the North, speculation is reviving. The chemical trade, for instance, was during November in a somewhat excited state. Prices went up, and then came down, and jumped about considerably. It was entirely owing to the operations of middle men, but it is also pretty well known that contracts have been made for chemicals, for next year's delivery, at higher prices than have been realized this.

The timber trade of the North of England is very steady.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

On the evening of Tuesday last the Alloa Burgh Commissioners held a special meeting for the purpose of considering the propriety of adopting the provisions of the Burghs Gas Supply (Scotland) Act, 1876, a requisition in reference to the same having been received from 151 of the ratepayers within the burgh. After some discussion on the subject, it was eventually resolved to adjourn its further consideration till the 18th of December, so that the ratepayers might have plenty of time to give it a thorough ventilation.

Mr. Leitch, the proprietor of the gas-works, Lochgelly, Fifeshire, has reduced the price of the gas 10d. per 1000 cubic feet, the price to consumers being now 7s. 6d. per 1000 feet. Even the reduced price seems to be very high, when it is considered that Lochgelly is only a comparatively short distance from the well-known cannel coal of Fifeshire.

At the fortnightly meeting of the Glasgow Police Board, held on Monday week, the inspector of lighting reported that, as directed by minute of committee of the 13th of October last, the burners in the lamps in Nelson Street, Tradeston, North Albion Street, and Renfrew Street, had been changed. The Lord Provost, noticing that the committee were now experimenting upon gas-burners, expressed a hope that they would very soon come to a conclusion as to which kind was the best. He recollected that the chairman of the Watching and Lighting Committee said it was intended this winter to get quit of all "rat-tails and mouse-tails," which were a disgrace to the city. The long winter nights were coming on, and the sooner the city was properly lighted the better. Treasurer Osborne said there were streets in the city in which the two classes of burners were now used, and as soon as the committee determined on which was the best, the whole city would be lighted with one kind of burner.

A special meeting of the Town Council of Dumfries was held on Friday last—Provost Smith presiding—to "resume consideration of the resolution of Town Council, on the 22nd of September last, to adopt and apply the Burghs Gas Supply (Scotland) Act, 1876, to the burgh." Considering the disjointed or disturbed condition of the town's municipal affairs, owing to the resignation of six members of the council shortly after the annual election in the beginning of November, and the fact that it was impossible to transact any business until the vacancies were filled up, Mr. Wood moved that the further consideration of the subject stand adjourned till the first Friday in February next. This was seconded by Bailie Nicholson, and agreed to. The meeting thought it only fair that the gentlemen to be elected to the vacancies should be taken into confidence on the question.

Before leaving Dumfries, it may be well to refer to the fact that Mr. Wood is still continuing his gratuitous services to the burgh, in the capacity of gas analyst. His report for the week ending Nov. 25, sets the illuminating power of the Dumfries gas at 24·50 standard candles. In publishing his weekly reports, he makes a point of comparing the qualities of the gas supplied to a number of other towns in Scotland along with the price paid in each instance. He mentions twelve towns in which the illuminating power varies from 24·90 candles (Leith) to 29 candles (Aberdeen and Galashiels), and where the price ranges from 3s. 9d. per 1000 feet (Galashiels) to 5s. (Kilmarnock), the price at Dumfries being 5s. 10d.

For the week ending 25th November the minimum illuminating power of the gas supplied from the four stations of the Glasgow Corporation Gas Commissioners ranged from 25·23 candles to 26·98 candles, the highest maximum being 27·79 candles at Partick station.

An interesting report upon the condition of the water supply works has just been submitted to the Dundee Corporation Water-Works Committee by their engineer and manager, Mr. Watson. He says that at two a.m. on the 15th ultimo the quantity of water which passed over the waste weir at the Loch of Lintrathen was about 103,000 cubic feet per minute, or at the rate of 927 million gallons per day.

The Perth Police Commissioners met on Wednesday evening to decide whether or not they should talk over the proposed water bill. On the previous evening the Water Commissioners had resolved to have nothing further to do with the committee of citizens, who had so far promoted the bill, unless they (the Water Commissioners) be the sole promoters. Treasurer M'Kenzie moved that all the heads of the agreement be approved of, with the exception of the sixth, which is to this effect:—"That three outside promoters be appointed to assist the commissioners in the promotion of the bill, and in the event of the outside promoters being dissatisfied with the manner in which the bill is promoted, it shall be in their power to bring the circumstances before certain barristers-at-law, and the commissioners shall be bound to conform to any directions the said barristers may make after hearing parties." The motion was adopted by a majority of 18 to 6.

At a meeting of the local authority of Inverkeithing, held on Monday, the 27th ult., it was resolved to take no steps at present with regard to bringing in an additional supply of water in connexion with the Glensherrup scheme.

As an evidence of their anxiety to prosecute the water scheme for Burntisland, the Town Council of the burgh have appointed a committee of five of their number.

The new water-works of Cupar have proved a perfect success. It is calculated that the gathering-ground will yield a superabundance of water for double the present population of Cupar.

There has been much unsettledness in the Glasgow pig iron market since last report. The latest report is 58s. 6d. cash, whereas on Thursday week 60s. was reached.

The coal market has been somewhat spasmodic during the past week, on account of the scarcity of waggons. Prices are unchanged, unless for immediate shipping lots, which fetch rather stiffer rates.

HAYLING ISLAND GAS SUPPLY.—A company has been formed for erecting the necessary works for supplying gas to the inhabitants of Hayling Island, Hants. The company has been registered, with a capital of £5000, in £5 shares.

RETFORD GAS SUPPLY.—At the meeting of the Retford Town Council, on the 24th ult., a resolution was come to appointing a committee of eight members to consider the question of the expediency of the purchase by the corporation of the works of the gas company, and to report upon the matter in all its bearings at a future meeting.

SAN PAULO GAS COMPANY, LIMITED.—The directors of this company have declared a dividend upon the ordinary shares in the company for the half year ending June 30, 1876, at the rate of 6 per cent. per annum. The directors add that everything is working favourably, and that the consumption of the company's gas is steadily increasing. The city of San Paulo is enlarging its borders and extending its facilities in view of the railway development now going on in the province.

GAS EXPLOSION IN WESTMINSTER.—An explosion of gas took place on the night of Tuesday, the 28th ult., on the premises of the Artisans, Labourers, and General Dwellings Company, Great George Street, Westminster. Several of the windows were blown out, a portion of the house damaged by a fire which ensued, and the rest of the house and its contents by breakage. A servant was burned on her hands and face, the back windows of Sir John Hawkshaw's house adjoining were blown out, and the back windows on four floors of Mr. Spofforth's house, and of the two houses in Delahay Street, occupied by Messrs. Gregory and Abernethy, civil engineers, were likewise destroyed, and the buildings and contents slightly damaged. The immediate cause of the explosion is not reported.

GAS EXPLOSION AT MARYHILL.—The *Glasgow Herald* states that on the night of the 27th ult., while one of the Maryhill lamplighters was lighting a lamp near the aqueduct bridge, Main Street, the cover was shot off high up into the air, and a loud report followed. The lamplighter ran back, and observing that the gas was burning out at the post head, commenced to open the earth at the bottom to try and discover the escape. In an instant another loud report was heard, the light at the top head communicated with the gas at the bottom, and the result was that the earth and stones were violently scattered about. The lamplighter got his face scorched, and the back of his head was struck by some of the stones in their descent to the ground.

EXPLOSION OF GAS AT BROMSGROVE.—On the 22nd ult., the manager of the Bromsgrove Gas Company, assisted by a lad, was endeavouring to discover an escape of gas in the road adjacent to some newly erected houses. A deep cutting had recently been made by the contractor, in order to connect the drainage of the

houses in question with the main sewer, and the state of the road in this part has necessarily been soft and "giving," through being imperfectly rammed, or not rammed at all. While employed in searching for the leak, a violent explosion occurred in the rear of the premises themselves, and in the gardens connected with them. On examining the premises it was found that the archings turned over two cisterns, formed for supplying the houses with soft water, had been blown off with terrific force, carrying with them the doors, the hinges of which were torn off as though they were brown paper, and in one case carrying the large stone covering of the man-hole of one of the cisterns completely through the ceiling. The heavy stone covering was also blown off the dumb-well, the masonry of which, as well as the cement lining and the masonry of the wash-houses, was very much damaged. At first the origin of the whole affair seemed enveloped in mystery, but subsequent examination showed that a gas-pipe crossing the cutting had been broken in two, probably by a heavy load passing over the newly-moved earth; and the escaped and escaping gas had found its way up the surface drain-pipe and into the soft-water reservoir and dumb-well, where it had accumulated, and a light having been brought into the vicinity, the explosion occurred.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

4332.—Watson, J., Greenwich, London, "Improvements in pumps." Nov. 13, 1876.

4422.—Lake, W. R., Southampton Buildings, London, "Improvements in and connected with the pistons of air and gas engines." A communication. (Complete specification.) Nov. 15, 1876.

4438.—Hamer, W., Northwich, Chester, "Improvements in ball-valves for water-cistern supply and other fluid supply purposes." Nov. 16, 1876.

4459.—Gent, P., Congleton, Chester, "Improvements in and appertaining to gas-stoves." Nov. 18, 1876.

4465.—Elliott, A., and Burnett, C., Stockton-on-Tees. "An improved method of raising water and other liquids." Nov. 18, 1876.

4477.—Birkett, T., Aston, Stafford, "Improvements in taps and cocks." Nov. 18, 1876.

4488.—Quick, R., Wharton Street, London, "Improvements in the construction of baths to be heated by gas." Nov. 20, 1876.

4504.—Marchant, R. M., Kirby Street, London, "Improvements in pumps and condensers for motive-power engines and other purposes." Nov. 21, 1876.

4516.—Abel, C. D., Southampton Buildings, London, "Improvements in the means of purifying sewage and other foul waters." A communication. Nov. 21, 1876.

4519.—Greenhill, W., Hampton Court, Middlesex, "Improvements in connecting service-pipes with drains to prevent sewage gases entering buildings." Nov. 21, 1876.

4526.—Symes, G., Stepney, London, "Improvements in apparatus for manufacturing, purifying, and economizing gas, parts of which improvements are applicable for other purposes." Nov. 22, 1876.

4527.—Lace, J., Penarth, Glamorgan, "An improvement in or applicable to the valves of bilge and other pumps." Nov. 22, 1876.

4540.—Dewrance, J., Borough, London, and Mallinson, J., Welwyn, Herts, "Improvements in cocks." Nov. 22, 1876.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2240.—Dennis, W., Holborn Viaduct, London, "Improvements in apparatus and pumps for forcing and discharging water, air, and other fluids and gases for extinguishing fires, and for other useful purposes." May 27, 1876.

2527.—Hazlehurst, G. S., Runcorn, Chester, "Improvements in and apparatus for pumping liquids and pumping and condensing gases, such apparatus being also applicable for use as a blowing or exhausting engine." June 19, 1876.

2939.—Dwyer, E., Mulkern Terrace, London, "Improvements in lamps and apparatus for automatically extinguishing lamps." July 19, 1876.

3164.—Brotherhood, P., Notting Hill, London, "Improvements in apparatus for compressing air or other elastic fluid." Aug. 10, 1876.

3598.—Horton, H., Finsbury Street, London, "Improvements in globe holders suitable for gas and other lamps." Sept. 14, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2866.—Broadbent, R., "Improvements in gas-governors." Oct. 2, 1869.

2897.—Farron, S., "Improvements in the construction of cocks or taps." Oct. 6, 1869.

3081.—Ofverberg, C. A., "Improvements in filters and filtering apparatus." Oct. 23, 1869.

Share List of Metropolitan Gas and Water Companies.

(*Corrected by Mr.* F. N. Golding, *Sun Court, Cornhill, from the latest Stock Exchange Quotations.*)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
10000	20	Anglo-Romano . .	20 0 0	9 0 0	16—18
5000	20	Bahia (Limited). .	20 0 0	2 0 0	12—13
1000	20	Do., do., redeem.	20 0 0	2 0 0	25—27
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	19—21
40000	5	Bombay (Limited).	5 0 0	7 10 0	7—7¼
10000	5	Do., fourth issue.	4 0 0	7 0 0	5—5⅛
10000	20	British (Limited) .	20 0 0	10 0 0	40—42
7500	20	Cagliari (Limited).	20 0 0	5 0 0	..
5300000*l.*	Sk.	*Commercial*	100 0 0	10 0 0	210—215
70000	100	Do., 7 per cent. .	..	..	..
20000	20	Continental Union.	20 0 0	6 0 0	22½—23⅛
10000	20	Do., new	12 10 0	6 0 0	2½—2⅝pm
10000	20	Do., preference .	20 0 0	7 0 0	27—29
75000	Sk.	*Crystal Palace District*	100 0 0	10 0 0	214—217
125000	Sk.	Do., 7 per cent. .	100 0 0	7 0 0	150—155
50000	Sk.	Do., preference .	100 0 0	6 0 0	135—140
23405	10	European (Limited)	10 0 0	10 0 0	18½—19⅛
12000	10	Do., new shares.	7 10 0	10 0 0	7—8pm.
35406	10	Do., new shares .	5 0 0	10 0 0	5—6pm.
3797770*l.*	Sk.	*Gaslight & Coke* A.	100 0 0	10 0 0	216 -218
1000000*l.*	Sk.	Do. B.	100 0 0	4 0 0	80—85
30000	10	Do. 5 per ct. pref. cons.,3rd issue.	all	5 0 0	20½—21
50000	10	Do. do., 4th do. .	6 0 0	5 0 0	8-8¼pm.
50000	10	Do. do., 5th do. .	2 0 0	5 0 0	7½-8pm.
2000000*l.*	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	230—240
3000000*l.*	,,	Do. D do. do. .	100 0 0	10 0 0	230—240
1650000*l.*	,,	Do. E do. do. .	100 0 0	10 0 0	230—240
300000*l.*	,,	Do. F 5 do. do. .	100 0 0	5 0 0	114—116
600000*l.*	,,	Do. G 7½ do. do. .	100 0 0	7 10 0	165—170
1300000*l.*	,,	Do. H	100 0 0	7 0 0	150—153
6200	5	Georgetown,Guiana	5 0 0	5 0 0	..
15000	10	*Surrey Consumers.*	10 0 0	10 0 0	21—22
10000	10	Do., new	8 0 0	10 0 0	9½-10½p.

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	Gas Companies.	£ s. d	£ s. d	£
9000	4	Unit. Genl.,Limrck.	4 0 0	2 10 0	2¾—3¼
1500	10	*Wandsw. & Putney*	10 0 0	10 0 0	19—20
1500	10	Do.	10 0 0	7 10 0	11—12
2957	10	Do.	10 0 0	7 0 0	..
993	10	Do.	3 0 0	7 0 0	..
16000	5	*West Ham*	5 0 0	10 0 0	8—8½
10000	5	Do., new shares .	2 10 0	10 0 0	3—4
		Water Companies.			
12000	100	Chelsea	100 0 0	6 0 0	144—147
1800000	100	East London . . .	100 0 0	6 0 0	156—153
8000	50	Grand Junction . .	50 0 0	5 0 0	72—75
5840	25	Do., ¼ shares . .	25 0 0	5 0 0	26—27
2160	25	Do., new ditto; max. div.,7½ p.c.	25 0 0	5 0 0	34—36
547960	100	Kent	100 0 0	8 0 0	175—178
970	100	Lambeth	100 0 0	6 5 0	149—152
1161	100	Do.	100 0 0	6 5 0	146—149
442	100	New River	100 0 0	7 0 0	185—195
4475	100	Do.	60 0 0	7 0 0	50-55pm
400000	100	Do.,deb.sk.,4p.c.	100 0 0	4 0 0	101—103
3036	100	Southwrk. &Vauxh.	100 0 0	4 0 0	111—114
1236	100	Do., pref. stock .	100 0 0	5 0 0	112—114
	100	Do., D shares . .	100 0 0	4 0 0	108—111
	100	Do., 4½ preference	100 0 0	4 10 0	106—108
	100	Do., new ordinary	..	4 10 0	..
1600	100	Do., new ord.No.1	40 0 0	4 10 0	106—108
12172	61	West Middlesex . .	61 0 0	6*l.*p.sh.	135—136

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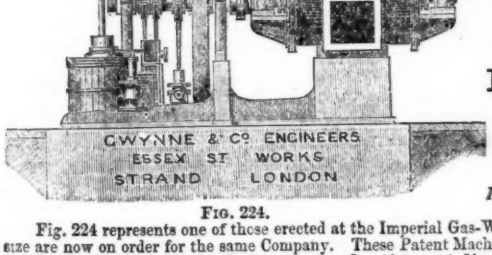

FIG. 224.

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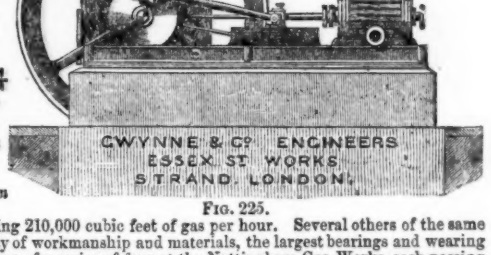

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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Apply to the BRYMBO COMPANY, WREXHAM.

WANTED, a situation as Rental Clerk. Five and a half years reference.
Address A., 6, Burford Road, High Street, Stratford, ESSEX.

WANTED, Spent Oxide. The Sheffield Chemical Company, Attercliffe, are prepared to PURCHASE large or small quantities.
Address, with particulars, the Proprietors, HORNBY, FAIRBURN, AND CO.

WANTED, a Traveller, on Commission, by a firm of 25 years standing, to take the place of one retiring, to travel amongst Gas Companies, Gas Engineers, Plumbers, and Ironmongers.
Apply, stating present employment, by letter only, to C. M., at Smith's Library, 33, Union Street, BIRMINGHAM.

WANTED, by the Advertiser, aged 33, a situation as ASSISTANT MANAGER or METER INSPECTOR. Has a sound practical knowledge of manufacture and distribution. First-class testimonials.
Address No. 333, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Working Manager of a Gas-Work, a SITUATION. Can do main and service laying, meter fixing, setting of retorts, clay or iron, inside or outside fittings of any description. Twelve years testimonials. Abroad preferred.
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WANTED immediately, in a large Provincial Town, a steady, respectable Man as METER INSPECTOR and Repairer. He will be required to take the indices quarterly, inspect private fittings, and make himself useful.
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A GENTLEMAN wishes to article his son to a resident Engineer and Manager of some good-sized Gas-Works.
Address No. 331, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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FOR SALE, Cheap, Two 5-h.p. Cornish BOILERS, in good condition. May be seen at the Reading Gas-Works.
Particulars can be obtained of Mr. E. BAKER, Engineer.

TWELVE Gasholder Columns for Sale, cheap and good, about 30 ft. high by 2 ft. diameter at base, 1 ft. 6 in. at cap. Moulded caps and bases, guide-rails, and brackets complete. Suitable for gasholder 80 ft. to 100 ft. diameter.
Apply to Mr. JAMES HALL, Manager, Gas-Works, St. Helen's, LANCASHIRE.

TO BE SOLD, very cheap, as they stand, for immediate removal, four Cast-Iron PURIFIERS, 10 ft. by 5 ft., with strong wrought-iron covers, wood sieves, and lifting apparatus complete, and 8-in. hydraulic centre-valve and connexions. Also a Station-Meter in cast-iron case, with clock and tell-tale, and bye-pass valves, all complete. To pass 6000 cubic feet of gas per hour.
The above apparatus has just been thrown out of use at the Uxbridge Gas-Works, where it may be seen.
Apply, for price, &c., to Mr. ALFRED PENNY, 20, Abingdon Street, WESTMINSTER.

GOVERNORS FOR SALE.

FOR SALE, at the Eccles Street Works of the Liverpool United Gaslight Company, two GOVERNORS, each having a 10-in. cone and 16-in. bye-pass.
Also four GOVERNORS, each having a 6-in. cone and 8-in. bye-pass. These Governors are in excellent order, and are fitted complete and ready for work, and have been replaced by apparatus of larger dimensions.
Apply to Mr. KING, Engineer, Gas Office, Duke Street, LIVERPOOL.

THE Shanklin Gas Company have for SALE the following PLANT:—
One Governor, by Bower, with 5-in. connexions, bye-pass valve, one 5-in. valve, one 4-in. valve.
20½ feet of D Hydraulic Main, 15 in. by 15 in., with dips complete, nearly new.
Nine 18 in. and five 15-in. Circular Mouthpieces, with lids and screws complete.
13 Ascension-Pipes, 5-in. to 4-in.
13 H-Pipes.
Apply to W. SUTHERLAND, Secretary, Shanklin, ISLE OF WIGHT.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
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Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

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TO MANUFACTURERS OF GAS-WORKS.

THE Directors of the Oatlands Park Hotel Company, Limited, Walton-on-Thames, are desirous of receiving estimates for a small manufactory to supply about 300 lights. They will do the cartage of the materials from the station.
Address the MANAGER.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)
The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 28th inst.
JULIAN GOLDSMID, Esq., M.P., the Chairman.
Resolved unanimously—"That the report upon the affairs of the Association now read be received, adopted, and entered on the minutes."
Resolved unanimously—"That a dividend of £2 per share, and a bonus of 10s. per share, be declared upon the 56,000 shares of the Association, for the half year ended the 30th of June last; and that the said dividend and bonus be payable, free of income-tax, on and after the 15th of December next."
Resolved unanimously—"That the remuneration of the Board be increased to £5000 a year."
"That the cordial thanks of the meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair this day."
Upon the motion of the Chairman, Mr. Julian Goldsmid, M.P., a vote of thanks was also given to Mr. G. W. Drory, the General Superintendent of the affairs of the Association on the Continent, and to the Agents, Engineers, and other Officers of the Association.
By order of the Board,
ALBERT F. JACKSON, Secretary.
30, Clement's Lane, Lombard Street, London,
Nov. 29, 1876.

TO TAR DISTILLERS AND OTHERS.

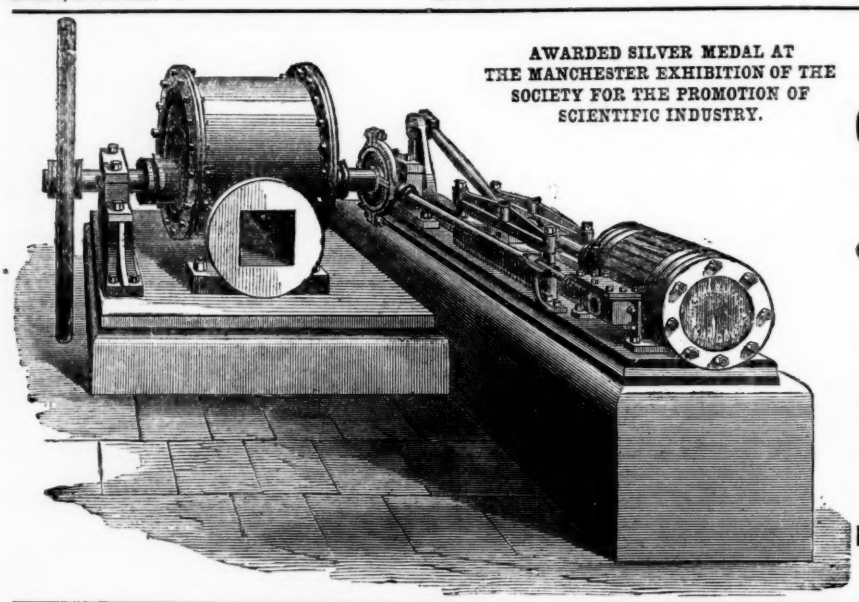
THE Directors of the Mitcham and Wimbledon District Gaslight Company are prepared to receive TENDERS for the surplus TAR produced at their works for One year, commencing from the 1st day of January next. The quantity of coal carbonized is about 8000 tons per annum.
Further particulars may be obtained on application at the Office of the Company, Mitcham.
Tenders to be sent to the Office not later than Monday, the 25th inst., endorsed "Tender for Tar."
By order,
BENJAMIN GREEN, Secretary and Manager.
Gas-Works, Mitcham, Dec. 1, 1876.

BELFAST CORPORATION GAS-WORKS.

THE Gas Committee of the Belfast Cor-poration are prepared to receive TENDERS for the AMMONIACAL LIQUOR produced at their works, for such a term as may be agreed on, say Three, Five, or Seven years, from the 1st of July, 1877.
The quantity at present made is about 800,000 gallons per annum, and a considerable increase may be expected.
Sealed tenders, endorsed "Ammoniacal Liquor," and addressed to JAMES GUTHRIE, Esq., Town-Clerk, will be received up to Jan. 1, 1877, and all information may be obtained on application to JAMES STELFOX, Manager.

BELFAST CORPORATION GAS-WORKS.

THE Gas Committee of the Belfast Cor-poration are prepared to receive TENDERS for the TAR produced at their works, for such a term as may be agreed on (say three, five, or seven years) from the 1st of July, 1877.
The quantity at present made is about 500,000 gallons per annum, and a considerable increase may be expected.
Sealed tenders, for whole or part, endorsed "Tar," and addressed to James Guthrie, Esq., Town-Clerk, will be received up to Jan. 1, 1877, and all information may be obtained on application to JAMES STELFOX, Manager.



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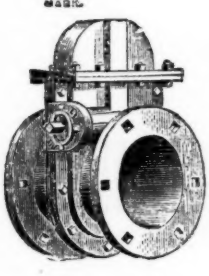

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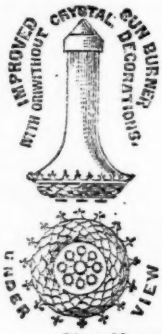

GAS MOONS,
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GAS REFLECTORS
In Silver and Glass
GAS NIES AND BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

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Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

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Effects a Great Saving in Labour, estimated at about £2 per Mouthpiece per Annum;
Renders Gas Companies less Dependent on Skilled Stokers; Makes a Charge Evenly and Quickly, and Prevents Waste of Gas; and can be Supplied and Erected at £2 10s. per Mouthpiece, including Royalty.

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STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.
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WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

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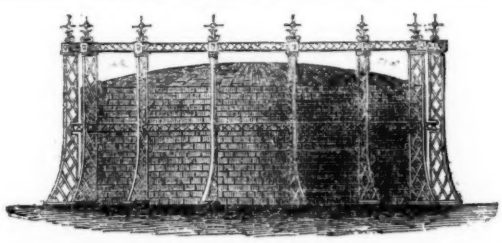

THE HORSELEY COMPANY,

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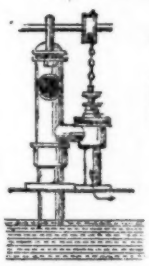
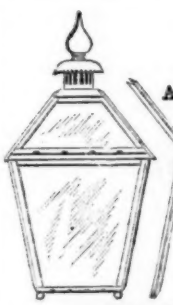


Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH.

Testimonials and particulars on application.

Address WALTER L. COPP, WATCHET, SOMERSET.



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Requiring New Street-Lamps are recommended

A **KEEN'S PATENT**
DOUBLE-CLIP
STREET-LAMP.

A great improvement on the old-fashioned 14-in. Lamps.

They have been sold to various Gas-Works throughout the country and abroad, and the highest satisfactory testimonials are given as to their superiority.

For particulars of price, &c., apply to

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18 & 20, ALSTON STREET, GLASGOW.

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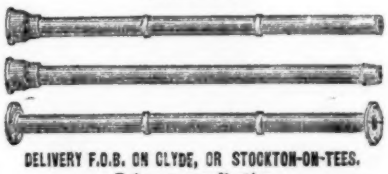

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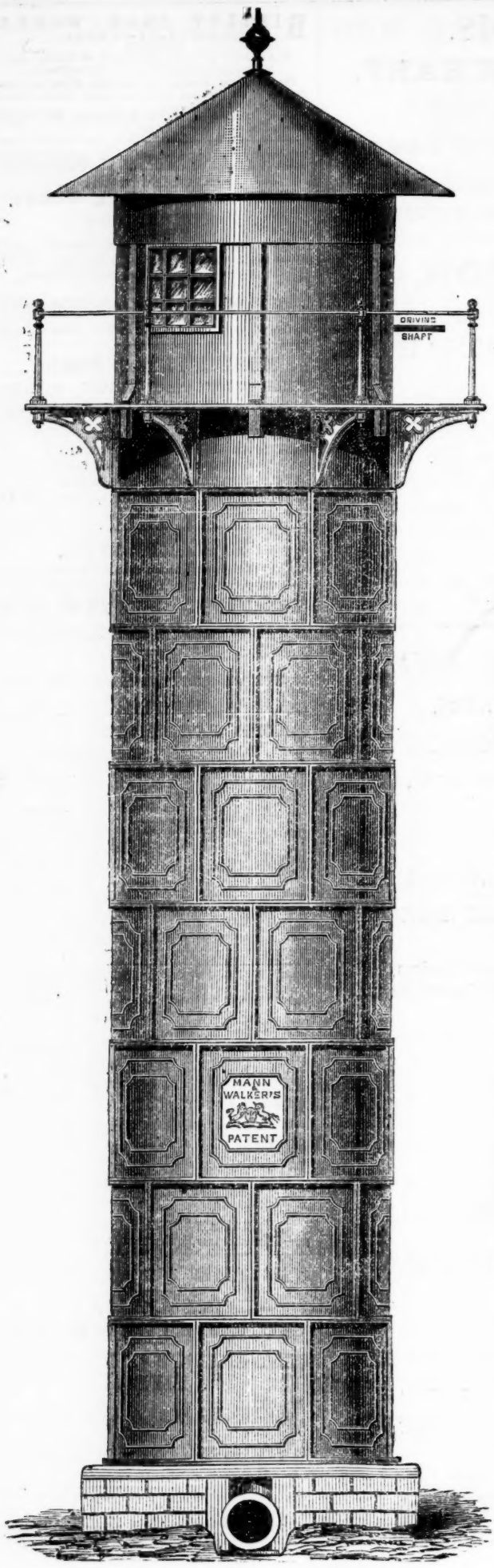

C. & W. WALKER,
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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re- quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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MANUFACTURERS OF EVERY DESCRIPTION OF
GAS APPARATUS.
CONTRACTORS FOR THE
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FOR TOWNS, COUNTRY MANSIONS, &c.
Estimates given free of Charge.

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OF THE HIGHEST EXCELLENCE ONLY;
ALSO LICENSEES AND MANUFACTURERS OF
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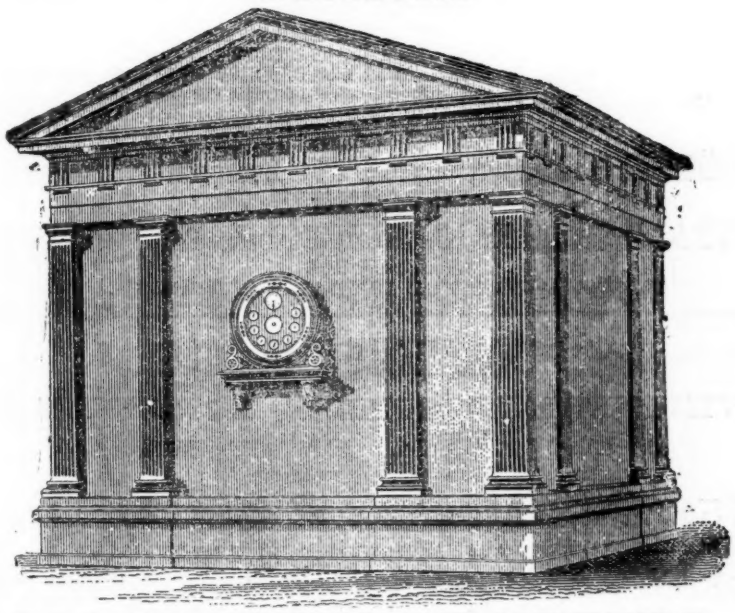
ROUND STATION-METERS,
ON CAST-IRON STANDS.



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GAS COOKING APPARATUS.
Home and Foreign Orders promptly attended to.
All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.
Orders almost invariably despatched on the day of receipt.
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Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
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INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.
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CATOPTRIC
LAMPS.
The NEW PATTERN
Is now placed throughout
CHEAPSIDE.
For Terms of Licence to Use and Manufacture, apply to
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THE DERBYSHIRE
SILKSTONE COAL COMPANY,
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CAN OFFER A
GAS COAL
Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

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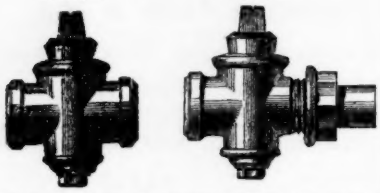
HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

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TORBAY IRON PAINTS.
(ESTABLISHED 1851.)

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Waggon Works, and the Paint Trade generally. They are the BEST PROTECTORS of IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to ironwork. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only before use to be thinned down in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.
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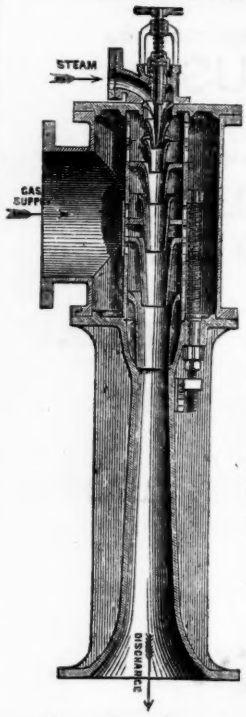
Germany: Cellerstr. 35, Hannover. Austria: Kolring., Pestalozzigasse 6, Vienna.
France: 11, Rue Louis-le-Grand, Paris. U. S.: 1645, N. 10th St., Philadelphia.



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STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.
Small Cost—Compactness—Perfectly Self-Acting—
Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—
No Extra Room Required—No Wear and Tear—No Noise—
No Oscillation in Vacuum, or Back Pressure.

UPWARDS OF 200 IN USE.
SUPPLIED TO—

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Horsham Gas Co.	Brentford Gas-Works.	Harrogate Gas Co.
Epsom and Ewell Gas Co.	Burnley Gas-Works.	Hertford Gas Co.
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E. KÖRTING'S PATENT STEAM-JET REVIVIFYING BLOWERS FOR THE PURIFYING MATERIAL.

SOLE LICENSEES FOR
W. CLELAND'S PATENT STEAM SCRUBBER,
Combining small cost and thorough efficiency, with absence of any mechanical means and necessity of renewing the scrubbing material.

FOR PARTICULARS, APPLY TO
KÖRTING BROS., 7 and 17, Lancaster Avenue, MANCHESTER,
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GERALD J. TUPP, 8, John Street, Adelphi, W.C., LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

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HYDRAULIC ENGINEERS,
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SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 10,000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

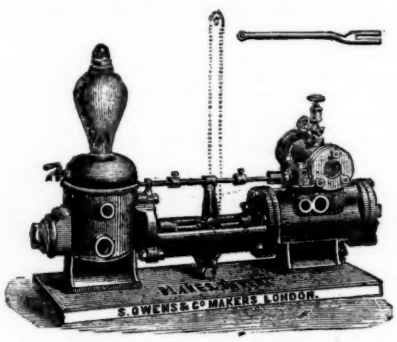
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12¼ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

HEBBURN MAIN GAS COALS.

Cubic feet of Gas yielded per ton . . .	10,050
Illuminating power in sperm candles . .	15·4
Yield of coke per ton of good quality . .	13¾ cwts.

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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

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Established 1840.

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CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

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SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

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JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

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STRONGLY RECOMMEND A TRIAL OF THEIR

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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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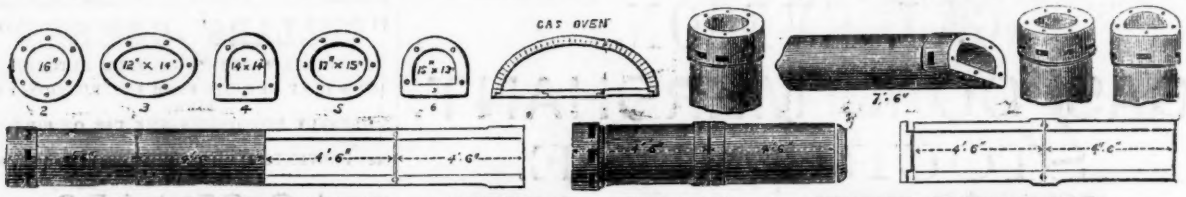

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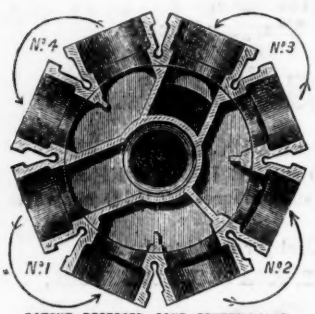
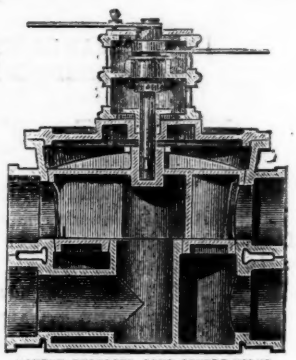


PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.



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